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**A STUDY OF INDUSTRIAL WASTE POLLUTION IN
THE SOUTH PLATTE RIVER BASIN. APPENDIX A.
INDUSTRIAL PLANTS VISITED AND NOT SAMPLED**

**Federal Water Pollution Control Administration
Denver, Colorado**

December 1966

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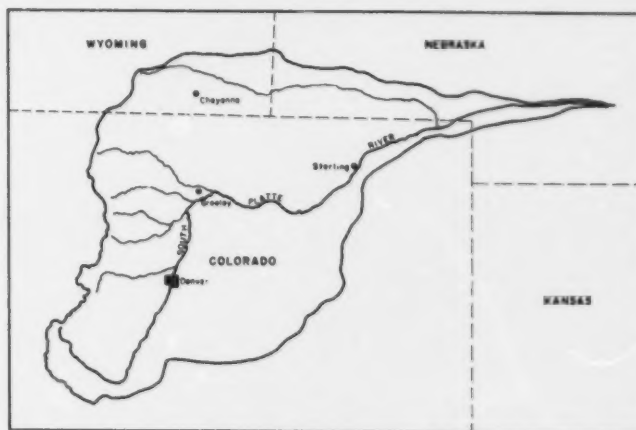
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APPENDIX A - INDUSTRIAL PLANTS VISITED
AND NOT SAMPLED

Supplement to the Basic Report -

A STUDY OF INDUSTRIAL
WASTE POLLUTION IN THE SOUTH
PLATTE RIVER BASIN



U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
South Platte River Basin Project
Denver, Colorado

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U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
South Platte River Basin Project
Denver, Colorado

DECEMBER 1966

APPENDIX A

A two and one-half year Industrial Waste Survey in the South Platte River Basin was culminated by the Federal Water Pollution Control Administration, South Platte River Basin Project in late 1966. The highlights of this Survey together with major recommendations on pollution abatement by industry are given in the basic report entitled "A Study of Industrial Waste Pollution in the South Platte River Basin." The Appendices shown herein represent a supplementary issue to the main report. However, these Appendices are essential to an understanding of the main survey and the primary document. The reader is encouraged to make full use of the four Appendices which have been prepared as four separate and additional reports and contain a wealth of information on the industrial waste picture existing within the Basin.

Appendix A gives pertinent information on the waste problems of 58 industrial companies. These plants were all visited but no waste sampling was undertaken by personnel of the South Platte River Basin Project. Appendix B presents detailed data on the waste handling and abatement procedures employed by 33 specially-selected industrial companies together with waste sampling results. In Appendices A and B, separate survey reports have been prepared for each of the 91 companies covered by the study. Appendix C provides the location and description of 639 outfalls, pipes and ditches representing potential or real sources of contributory pollution to Basin streams. These outfalls receive industrial wastes from one or more industries which could not be readily identified. Waste sampling was undertaken on 74 of these outfalls and all results are shown. Appendix D contains the results of a special study on the waste disposal problems of the meat industry within the Denver Metropolitan Area.

Appendix A included under this cover and entitled "Industrial Plants Visited and Not Sampled," is subdivided into two main sections, 40 companies within the Denver Metropolitan Area, and 18 in the Remainder of the Basin. A separate report is given for each of the 58 companies represented. The group covers a wide range of industries including oil refining and reclaiming, machining and fabricating shops, foundry and extruding operations, meat and poultry processing, wood preserving and conditioning, soft drink bottling, baking and candy manufacturing, milk processing, railroad yards, fruit and vegetable processing, cement production, and general and specific chemical works. The pretense is not given that all industries are accounted for that probably should have been included in this group. Limitations on time, manpower and sources of exploratory data precluded a complete and exacting coverage. Outside of the industries sampled and included in Appendix B, this group represents the companies most likely to experience separate waste disposal to Basin streams, and/or have important waste problems.

In most cases, the plant reports contain information on the date of visit, persons contacted, process and operation, sources and uses of

water, sources and characteristics of wastes, treatment and disposal of wastes, and particular waste problems together with suggested courses of action for coping with these problems. It is noted that specific recommendations for waste abatement and treatment in cases where this was found necessary, are to be found in the main report.

The following listing shows the Company name, city or county location, and page numbers assigned to the particular writeup as it appears in Appendix A. Constructive criticism is solicited and essential to the validity of the information contained in this report.

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DENVER METROPOLITAN AREA

AERO AIRPLANE OIL COMPANY
5801 North Federal Boulevard
Adams County, Colorado

Date of Visit: August 4, 1964

Person Contacted: Roy Requa

Process and Operation: The Aero Airplane Oil Company salvages and reclaims spent or used oil received from various aircraft and trucking companies, service stations and other sources in the Denver Metropolitan area.

Sources and Uses of Water: Drinking water is obtained from a 110-foot well. Two other wells, each 18 feet deep are operated on an intermittent basis and supply water for boiler-makeup, cooling and lawn irrigation.

Sources and Characteristics of Wastes: Excess bleed-off from the boilers, spent cooling waters from the overhead condensers, and spillage containing various amounts of oil comprise the wastes of potential problem at this plant. Bleed-off and waste coolant waters are reported to approximate 500 gallons per week.

Treatment and Disposal of Wastes: The Aero Airplane Oil Company receives and stores incoming oil. Before reclaiming, the oil is transferred to a small separation tank. Tar residues are removed and transported to the City of Denver dump, and the desirable oil fractions are processed in the plant. A carbon residue forming on the bottom of the distillation column is also conveyed to the City dump, whereas the top distillates are burned in the boiler.

Small amounts of wastewater, apparently boiler bleed-off together with spent coolants as described above, are released into a small drainage ditch which intercepts Clear Creek at RM 4.5. At the time of plant visits, evidence of prior oil spillage was noted along the ditch. Company personnel stated that this oil layer after accumulation, is eliminated by burning. It was also reported that oil may become admixed with the ditch waters only when there is high runoff in the ditch. Such oily discharges should be completely prevented from entering the ditch, and disposed of adequately and by separate means. Also, any other waste discharges of serious consequence to the waters of Clear Creek should be adequately treated or eliminated.

Domestic wastes from the plant are collected and disposed of into two 500-gallon septic tanks provided by the Company.

ALTBERGER PACKING COMPANY
5600 York Street
Adams County, Colorado

Date of Visit: June 29, 1964

Person Contacted: Louis Altberger, President

Process and Operation: The Altberger Packing Company owns and operates a slaughterhouse which on the average month receives 550 cattle, 110 hogs, and 25 calves. The Company principally dresses-out beef and hog carcasses which are sold as whole sections, halves, or quarters. These products receive City inspection before sale. The plant does not conduct rendering operations. The normal work-week consists of 5 days, 8 hours per day. The number of employees was not determined.

Sources and Uses of Water: A single 40-foot deep well serves various needs of the plant including water for process, cooling, and other. Bottled water is used for drinking purposes.

Sources and Characteristics of Wastes: Process wastes contain blood, dirt, grease, bacteria, paunch manure and other solids. Discarded materials originate from the killing and dressing areas. Other wastewater includes spent cooling waters and domestic sewage.

Treatment and Disposal of Wastes: The Altberger Packing Company in contrast to the typical slaughterhouse or packinghouse in the Denver area provides no known in-plant recovery of waste material to the sewers. However, process wastes are retained in catch basins for a short time prior to final disposal. Plant wastes containing large amounts of blood, grease and paunch manure are discharged directly into the North Washington Water and Sanitation District sanitary sewers. The Altberger Packing Company is one of the major reasons for gross overloading of the North Washington District sewage-treatment plant with drastic reductions in treatment efficiency. The Altberger Packing Company should establish at the earliest possible time, adequate procedures for in-plant recovery and treatment of gross waste loads now entering the sewer.

AMERICAN COLEMAN COMPANY
5801 South Nevada Street
Littleton, Colorado

Date of Visit: August 27, 1964

Person Contacted: H. Swank, Superintendent

Process and Operation: The Littleton plant of the American Coleman Company assembles heavy-duty motor vehicles of various types including four-wheel drive trucks, aircraft towing tractors and others. Total staff ranges from 240 to 250 persons engaged in administrative, engineering and shop positions.

Sources and Uses of Water: Total plant water supply is received from the City of Littleton. Water use over the 12 months of 1963 amounted to 2.4 million gallons. In-plant water uses include processing, steam cleaning, domestic services, and water-cooling of the protective curtain in the paint shop area.

Sources and Characteristics of Wastes: Plant wastes comprise the spent materials from the paint shop area, industrial coolant residues, machining and industrial solvents containing oils, and domestic sewage.

Treatment and Disposal of Wastes: Solid wastes from the paint room are placed in 50-gallon containers and transported from the plant. Industrial oils and coolants used in cutting and machining operations are reused whenever possible. Waste oil is collected separately and transported from the plant.

Domestic sewage is released to the City of Littleton municipal sewers. The spent waters from the protective curtain in the paint room together with miscellaneous floor drainage are however, released to an adjoining storm sewer. Further survey of these latter wastes should be undertaken by the appropriate State regulatory agency in the near future.

APPROVED DRAIN OIL SERVICE
7451 Smith Road
Denver, Colorado

Date of Visit: July 31, 1964

Person Contacted: Milt Adams

Discussion: The Approved Drain Oil Service at its Denver station provides collection, storage, and transfer facilities for oils salvaged from various companies in the metropolitan area. Oils are received at the station in collection trucks and placed in underground storage tanks. From the storage tanks the oily material is pumped to a railroad tank car on the Missouri Pacific Railroad line and subsequently transported to Ogden, Utah for eventual reclaiming. There is some spillage in storage and transfer operations but this waste was observed to be self-contained, and should cause no problems in stream pollution. The Approved Drain Oil Service rents the collection trucks from the Ryder Truck Company. The trucks are returned to the Ryder Truck Company at periodic intervals for necessary washing and cleaning.

BARBER POULTRY, INC.
Broomfield, Colorado

Date of Visit: June 25, 1964

Person Contacted: Russel Barber, President

Process and Operation: The Barber Poultry establishment in Broomfield, Colorado receives live poultry and converts these to the dressed product which after being chilled and frozen, are sold to the distributor. The Broomfield plant processes an average of 400,000 turkeys and 30,000 chickens during the year. Operations are conducted essentially from June through January, and are classed as seasonal. The firm retains 8 year-round employees. During the processing months, the establishment functions 8 hours a day, 5 days each week with a total of around 105 persons.

Sources and Uses of Water: Plant water supply is received from three wells ranging in depth from 900 to 1100 feet, with a combined capacity of 200 gallons per minute. No treatment is provided these waters before use.

Sources and Characteristics of Wastes: Waste effluents originate from the killing and processing areas, floor and equipment cleanup, boiler blowdown, spent cooling waters, and from domestic sewage. Detailed information was not solicited on the nature of process operations and in-plant waste recovery practices. It is, however, known that blood is separately recovered from the killing area. Poultry processing wastes in general are characterized by relatively high organic and solids content.

Treatment and Disposal of Wastes: Liquid wastes from the killing and process areas are initially passed through a baffled tank and feathers and offal are removed by mechanical means. These solids together with blood recovered within the plant are disposed of daily to an outside buyer. Combined processing wastes then receive treatment in a series of small settling basins followed by two lagoons in parallel. The wastes may be directed to any one of 8 identical settling chambers which are batch-filled in sequence. The 8 cells comprise a total area of 2 acres. The cells are operated at a liquid depth of about 1.5 feet. The wastewater is allowed to settle-out over a period of a few days, and the settled overflow is subsequently released into one of the two lagoons. The large ponds approximate 3 and 5 acres respectively in surface area, with liquid operating depths between 3 and 5 feet. At the time of plant visit the lagoons were green in color but no odors were present. The location of the poultry processing plant excludes the possibility of direct discharge to a receiving stream. An adjoining farmer utilizes the wastewater within the lagoons for irrigation of croplands.

Domestic sewage from the establishment is collected separately, and receives treatment in a settling tank followed by a tile leaching field.

BELL PACKERS, INC.
5600 York Street
Commerce City, Colorado

Date of Visit: September 9, 1964

Persons Contacted: Mr. Singer, Manager
Norm Spier

Process and Operation: The Denver plant of Bell Packers, Inc., previously known as the Marco Packing Company is classed as a beef slaughterhouse. The plant also has feedlot facilities for around 1,100 cattle. The average daily kill is about 125 animals per working day. The plant does not conduct rendering operations. The normal schedule is a 5 day week, 8 hours per day. The Company employs the services of 20 persons.

Sources and Uses of Water: Plant water supply approximating 100,000 gallons per day is received entirely from the North Washington Water and Sanitation District. Plant water uses include washing of carcasses and animal parts, equipment and floor cleanup, sanitary services, and some cooling and refrigeration.

Sources and Characteristics of Wastes: Process wastes from the establishment comprise blood, grease, paunch manure, meat and bone scraps, spent cooling water and miscellaneous.

Treatment and Disposal of Wastes: Blood, principally derived from the killing area, is collected separately in a 1000-gallon storage tank and sold to the Meinerz Blood Dehydrating Company of Denver.

Paunch manure is handled and collected without the addition of water into a separate tank. Paunch contents are disposed of to a fertilizer company or to local farmers.

The remainder of plant wastes flow into a catch basin which is 4 by 6 feet by 3.5 feet in depth. Grease is partially recovered, and settleable solids are removed from the bottom of the tank once each week by the Acme Sanitary Pump Company. The overflow wastewaters are discharged completely to the North Washington Water and Sanitation District sewers and sewage treatment plant. Domestic sewage is also discharged to the District.

Manure from the holding pens is disposed of to the Ruedy Fertilizer Company. Feedlot drainage flows into a pit located on the north end of the holding area and normally seeps into the ground. There are no known waste discharges entering the South Platte River.

The Company anticipates considerable plant expansion in the next three years. A new and increased water supply will be made available from the City of Denver and the processing rate is expected to reach a level of 1,000 cattle per working day.

BRODERICK WOOD PRODUCTS COMPANY
5600 Huron Street
Denver, Colorado

Date of Visit: July 7, 1964

Person Contacted: Samuel A. Tait, Plant Manager

Process and Operation: The Broderick Wood Products Company provides preservation treatment to various wood products. Utility poles, posts, railroad ties and various other items are impregnated with creosote or a pentachlorophenol formula to give the wood greater durability. The Company operates 5 days per week, 8 hours per day. The total staff comprises 32 persons of which 4 persons are utilized on the two swing shifts.

Sources and Uses of Water: Plant process water amounting to about 22,000 gallons per working day is supplied from a single well, 800 feet deep. The principal use of water is makeup for the boilers generating steam necessary for the treatment of lumber. Two 50,000-gallon tanks store water for fire protection needs.

Sources and Characteristics of Wastes: Process wastes containing appreciable amounts of oils and phenols are produced from the combined chemical-steam treatment of lumber. Additional wastes include boiler blow-down and domestic sewage.

Treatment and Disposal of Wastes: The spent creosote and pentachlorophenol solutions are separated into respective fractions and reused within the process. The non-separable liquors together with boiler blow-down are released into an earthen holding pond 0.2 acres by 10 feet deep. The pond is skimmed periodically for oil recovery and the oil is reused within the plant. A second and smaller pond is provided for overflow from the first holding basin. At the time of plant visit, no overflow was present. The domestic sewage originating from the establishment is collected separately and disposed of into a septic tank followed by a leaching field.

CANADA DRY BOTTLING COMPANY
2840 South Zuni Street
Englewood, Colorado

Date of Visit: June 23, 1964

Persons Contacted: John Weiss, Manager
Lester Simms, Assistant Manager

Process and Operation: The Englewood plant of the Canada Dry Bottling Company manufactures and bottles carbonated soft drinks in the lines of ginger-ale, quinine water and cocktail mixes. Raw materials include pre-mixed syrups, sugars, citric acid, sodium benzoate, and other materials. Facilities are available for the washing and cleaning of old bottles which are reused in the process. The establishment employs 39 persons distributed as follows: production - 14; administrative and office management - 4; delivery, sales and vending - 21. The plant is in operation from 7:30 AM to 4 PM, 5 days a week, throughout the year.

Sources and Uses of Water: Total plant water is obtained from the City of Englewood. Water use over 1963 was 4.1 million gallons or approximately 16,000 gallons per working day. The water required for direct use in the product receives in-plant treatment consisting of chemical coagulation, settling, sand-gravel filtration, and activated-carbon adsorption. The sand and gravel filter bed is backwashed every third day. Other demands for water within the plant are bottle washing, boiler feed supply, floor and equipment cleanup, and domestic needs.

Sources and Characteristics of Wastes: Spent waters leaving the bottle washing machine represent the largest single volume of waste within the plant. The machine employs a caustic solution which is recycled in cleaning. Boiler blowdown water is released on more or less a continuous basis. The floor drains receive the washdown and cleaning waters, spillage, spoiled materials, and various other wastes.

Treatment and Disposal of Wastes: Processing wastes pass through a sump within the plant which is approximately 4 feet in diameter and 12 feet deep. These wastes are then released to the City of Englewood sanitary sewers. Settleable solids are removed from the sump once a month by an outside contractor. Sanitary wastes are discharged directly to the municipal sewage system.

CONTINENTAL BAKING COMPANY
80 East 62nd Avenue
Adams County, Colorado

Date of Visit: September 3, 1964

Person Contacted: John Harty, Chief Engineer

Process and Operation: The Continental Baking Company specializes in the baking and production of various breads, cakes, and pastry items. These products are marketed under the names of Wonder Bread and Hostess Cakes. The Company employs 425 persons of which 200 people are engaged in pickup and delivery. Operations are conducted more or less over 24 hours of the day, 6 days each week.

Sources and Uses of Water: Plant water supply, except that used for lawn irrigation, is obtained from the North Washington Water and Sanitation District. Average daily demand estimated at 60,000 gallons per day is directed to domestic and culinary needs, laundry, boiler makeup, air conditioning and cooling, and the cleaning of equipment, floors and the delivery trucks. Water for lawn irrigation is received from a single, 40-foot deep well.

Sources and Characteristics of Wastes: Plant wastes consist of leftover food material from processing and the plant cafeteria; laundry wastewater from a small, commercial-type washer; spillage; wastewater from cleaning which contains dirt, soaps, solvents and miscellaneous; and domestic sewage. Also, a truck washing area maintained outside the main plant is responsible for additional liquid wastes.

Treatment and Disposal of Wastes: All waste effluents from the plant, except those originating from the truck washing area, are discharged into the sanitary sewers of the North Washington Water and Sanitation District. Drained oil from the trucks is collected for delivery to an oil reclaiming company in the Denver area. The outside truck washing wastes are presently released into an adjoining storm sewer which leads to the South Platte River. These wastes should definitely be diverted at the earliest possible time from the storm sewer into the municipal sewers of the North Washington Water and Sanitation District.

CUDAHY PACKING COMPANY
4801 Brighton Boulevard
Denver, Colorado

Date of Visit: February 28, 1964

Persons Contacted: Robert Clauss, Superintendent
Roy Coogle, Assistant Master Mechanic

Process and Operation: The Cudahy Packing Company owns and operates a packinghouse in Denver receiving both cattle and hogs. Basic operations consist of slaughtering, processing of meat products, and the rendering of edible and inedible by-products.

The carcasses are dressed-out and marketed in various cuts of fresh, smoked, and cured meats. Processing includes specialty cuts, cleaning of casings, sausage making, and other. Side products are hides, chit-terlings made from the stomachs of hogs, and the various products of the rendering operations. Rendering utilizes viscera, meat scraps, bones, and a host of other discards from both beef and pork. Rendering products include fertilizer, inedible tallows and bonemeal.

Processing is conducted over 10 hours of the day, 5 days a week. This is followed by a cleanup period requiring 8 hours each day. The rendering operations are maintained round-the-clock. The Cudahy Packing Company employs 350 persons at the processing plant and about 20 persons in the office. During the average day, the plant receives and processes 1,450 hogs and 190 cattle.

Sources and Uses of Water: The entire plant water supply is received from the City and County of Denver. Factory water needs average 400,000 gallons per day, the large majority of which is used between the hours of 7 AM to 9 PM. The average amount of water necessary for hog processing was reported as 200 gallons per hog unit.

Sources and Characteristics of Wastes: Major sources of in-plant wastes are as follows:

1. Blood primarily from the killing area
2. Grease from overall processing
3. Paunch manure from the stomachs of cattle
4. Caustic hair-dissolving solution
5. Liquids from the wet-rendering operations
6. Condensed vapors from the pressure cookers used in rendering. These condensates are diluted with City water before discharge to the municipal sewer
7. Condensed vapors from the blood dryers
8. Bleed-off waters from the cooling system

Treatment and Disposal of Wastes: In-plant waste recovery practices comprise the screening of paunch manure followed by settling in a single 8 by 8 by 6 foot deep chamber and disposal of solids to the Ruedy Fertilizer Company; the installation of baskets on each of the floor drains to catch gross solids before entering the sewer; recovery of blood and grease which are directed to the rendering operations and; two catch basins each approximately 2.5 by 30 by 5 feet deep through which most plant wastes are passed before final disposal to the sewer. Grease is skimmed and settleable solids removed from the catch basins once each day. All processing wastes after in-plant recovery, including those from the rendering operations, are released and disposed to the City and County of Denver sanitary sewers.

Manure from the cattle feedlot pens of the Gudahy Packing Company is removed and transported to the Ruedy Fertilizer Company, whereas spent livestock drinking water and field drainage are directed to the municipal sewers. Cattle holding facilities are minimal at this plant. The Company also at a future time plans to install automatic grease skimmers on the catch basins which will guarantee freshly-collected grease and improved color of the tallows produced by rendering.

DENVER BONELESS BEEF COMPANY
2001 East 58th Avenue
Adams County, Colorado

Date of Visit: September 9, 1964

Person Contacted: I. Greenstein, President

Discussion: The Denver Boneless Beef Company prepares specialty beef cuts from cattle halves and quarters. The operations consist of cutting and preparing small-package meat products together with other meat processing. Plant water supply approximating 10,000 gallons per day is received from the North Washington Water and Sanitation District. Liquid wastes from meat cutting and the cleaning of floors and equipment contain grease, fat, organic material and solids. Blood and paunch manure are not present in these wastes. Floor drains in the plant are equipped with screens to catch gross solids before entering the sewer. Meat and fat scraps, bone, and other materials remaining after cutting are collected into drums and sold to the Denver Rendering Company. Plant waste effluents are disposed of completely to the sanitary sewers of the North Washington Water and Sanitation District. Domestic sewage is also discharged to the District.

DOW CHEMICAL COMPANY
(In conjunction with the Atomic Energy Commission)
Rocky Flats Plant
Jefferson County, Colorado

Date of Visit: December 18, 1963 (with follow-up telephone conversations on April 13-14, 1966).

Persons Contacted: Ed Ryan, Specialist, Waste Disposal Group, Dow Chemical Company
G. E. White, Assistant Director of Service Laboratories, Dow Chemical Company
Fred Linck, Senior Utilities Engineer, Plant Services Group, Dow Chemical Company
Gene Vance, Industrial Wastes Engineer, Manufacturing Technical Group, Dow Chemical Company
Lloyd Grow, Technical Specialist, Atomic Energy Commission

Discussion on Characteristics, Treatment and Disposal of Wastes:

No information was obtained on process and operation since such data is considered "classified" under regulations of the Atomic Energy Commission.

A) Sewage from the industrial plant averaging 156,000 gallons per day in 1963, receives treatment consisting of comminution, primary settling, mechanical aeration, and chlorination. Chlorine is used both for its bactericidal effects and as an oxidizing agent. A chlorine residual of between 10 and 20 mg/l is maintained in the treated effluent. In 1963, an average BOD removal of 87 percent was reported, before chlorination. A third aeration tank was installed subsequent to 1963 to improve treatment efficiency. However, also during this time period, laundry wastes were added to the treatment facility.

B) Laundry wastes in 1963 approximating 14,000 gallons per day were combined with dilute wastewaters from the industrial waste treatment area, and discharged to a series of four ponds below the sewage treatment installation. These ponds also receive the effluent from the sewage treatment facility. The ponds are operated as an integral part of the sewage and industrial waste treatment system and the effluent from the lowermost pond is carefully monitored. Analyses are conducted for suspended solids, common minerals, and trace elements. Concentrations are reported to be held within the limits prescribed by the U. S. Public Health Service Drinking Water Standards.

The pond effluent discharges off the property to Walnut Creek which flows into the Great Western Reservoir approximately one mile distant from the ponds. The City of Broomfield derives part of its municipal

water supply from the Great Western Reservoir and these storage waters are also used for crop irrigation.

Information obtained from the Dow Chemical Company in 1966 indicated that wastewater from two of the three laundries at the plant had been connected to the sewage treatment installation since 1963. Wastes from the third laundry was expected to be directed to the sewage treatment installation starting in mid-summer of 1966.

C) All industrial process wastes are collected into tanks at the production areas and pumped in batches to the process waste treatment site which received about 6,000 gallons of waste daily in 1963. Treatment is solely for the removal of radioactivity. Concentrated toxic and radioactive industrial wastes are pumped to three 1-acre evaporation ponds. These ponds are lined with an impervious membrane and have a combined capacity of about 5 million gallons. The wastes held in the ponds contain excessive amounts of fluoride, nitrate, magnesium, calcium and other materials. The Company in the very near future will abandon the waste holding ponds and these concentrated wastes will be passed through a commercial-type evaporator unit followed by solids drying. The solids will be shipped to Arco, Idaho for burial. The evaporation and drying installation is scheduled to start operation in January, 1967.

D) Other possible wastewater includes runoff from the plant site and cooling waters which are discharged into a single pond and the effluent from which drains into another branch of Walnut Creek. The Company also maintains a close monitoring on this system.

E) Monitoring by the Colorado State Department of Public Health over the waste disposal system of the Rocky Flats plant through the past few years has indicated no detrimental effects and no pollution of surface water streams. The Company also provides routine testing of the City of Broomfield finished water supply. All tests have shown favorable results and a safe water supply.

ELECTRON CORPORATION
5101 South Rio Grande Street
Littleton, Colorado

Date of Visit: August 27, 1964

Persons Contacted: Frank L. Tetteimer, President
Jerry Jaques, Superintendent
Robert Tulk, Safety Engineer

Process and Operation: The Littleton plant of the Electron Corporation consists of a foundry, machine shop, and sheet metal works devoted to the production of gray iron, alloy iron, ductile iron castings, and V-belt pulleys. The Company operates essentially on a two-shift basis over a 5 day week, and employs 300 persons in administration, engineering, and production.

Sources and Uses of Water: The entire plant water supply is received from the City of Littleton. Water use over the year 1963 approximated 11.5 million gallons or about 48,000 gallons per working day. Major water demands are cooling, washing of products, boiler makeup, air pollution-control devices, and domestic needs.

Sources and Characteristics of Wastes: Plant wastes consist of spent cooling waters; boiler blowdown; metal part washings; residues, waste paint, solvents and other materials from the painting preparation room and from the paint room; spent waters from the air pollution-control devices on the smoke stacks; roof drainage; and domestic sewage.

Treatment and Disposal of Wastes: The protective paint curtain in the paint room is equipped with a recirculating water system and an inner filter for removal of solids from the recycled waters. These solids are collected and transported to a dump area. Solids accumulated in the parts-cleaning tanks are also removed and transported to a dump.

Process wastes receive virtually no treatment within the plant and are disposed of, together with domestic sewage, to the sanitary sewers of the City of Littleton. However, two waste streams are excluded from the sanitary sewer. Boiler wastewater and roof drainage by design, are connected to an adjoining storm sewer which presumably enters the South Platte River. Careful control should at all times be maintained on any discharges permitted to this storm sewer.

FARMERS TOOL AND SUPPLY COMPANY
5995 Washington Street
Adams County, Colorado

Date of Visit: September 1, 1964

Persons Contacted: Don Smith
Ralph Horst
Leo Colowick

Discussion: The Farmers Tool and Supply Company provides metal fabricating and finishing which includes the plating and coating of metal products. The Company employs 200 to 250 persons over a 9-hour working day. The establishment receives its water supply from the North Washington Water and Sanitation District which approximates 20,000 gallons per day. Supplemental water is obtained from a single, 600-foot deep well having a capacity of 20 gpm. Major water uses in the plant consist of boiler makeup, air conditioning, water-cooling of the protective curtain in the painting room, makeup for the plating tanks and rinse basins, and cleanup of floors and equipment.

A major part of the plant wastes originates from the metal-finishing operations which includes plating, iron phosphate, dichromate or alodine coatings, and other treatment of metal parts. Total process wastes and domestic sewage are discharged to the sanitary sewers of the North Washington Water and Sanitation District.

GENERAL IRON WORKS
600 West Bates Avenue
Englewood, Colorado

Date of Visit: August 26, 1964

Persons Contacted: Richard Snow, Plant Engineer
Jim Ogard, Safety Engineer
Ray Stroh, Master Mechanic
J. Devaney, Assistant Master Mechanic

Process and Operation: The Englewood plant of the General Iron Works consists of a foundry together with forging, plate fabrication and metal-finishing shops. The Company operates 24 hours a day, 5 days a week. Employment ranges from 400 to 500 persons of which 80 percent work on the day shift.

Sources and Uses of Water: Total plant water supply averaging 130,000 gallons per day is received from the City of Englewood. Principal uses of water are the cooling of compressors and the cupola or melting furnace, and requirements in the hydro-blast process for the smoothing of castings. Compressor cooling and cupola cooling utilize 65 percent and 27 percent respectively, of the total water supply. Waters from the compressors are in turn reused in the hydro-blast process. There is some recycling of water through the cupola. Other water uses include boiler makeup, air-conditioning, pressure tank testing and domestic needs.

Sources and Characteristics of Wastes: The most important waste is that derived from the hydro-blast process consisting of water, sand, iron particles, and miscellaneous materials. Spent cooling waters from the cupola although relatively free of dissolved and suspended matter have temperatures in the order of 140° F. The cupola is in use every other day. The remaining industrial wastewaters arise from steam cleaning, pressure tank testing, and air and boiler conditioning, and may be classed as relatively weak wastes.

Treatment and Disposal of Wastes: Spent waters from the hydro-blast process are passed through a clarifier tank prior to discharge into the sanitary sewers of the City of Englewood. Settled sludge is removed from the tank and transported to a dumping area.

Wastewaters from pressure tank testing, boiler blowdown, and steam cleaning operations are directed to a seepage-evaporation pond located north of the main plant. Blowdown wastes from the air-conditioning cooling towers are disposed of onto the ground. Domestic wastes from the plant are discharged to the City sanitary sewers.

Spent cooling waters from the cupola are permitted to flow into an adjoining storm sewer which enters the South Platte River near Dartmouth Avenue. Careful control should at all times be placed on any and all discharges entering this storm sewer.

GENERAL MOTOR OIL COMPANY
5318 Lowell Boulevard
Adams County, Colorado

Date of Visit: August 5, 1964

Persons Contacted: Otto Michalke, Owner
Mr. Moore (Retired)

Discussion: The General Motor Oil Company operates a plant for the reclaiming of used oil. The Aaron Oil Company supplies the spent oil. The reclaiming plant is in operation only one day of every two weeks. Water needs mainly for boiler makeup and cooling purposes are supplied by a single water well. Industrial wastes are of relatively small volume. Spent cooling waters and miscellaneous are disposed of to the land surface and seep in the ground over a short distance. These wastewaters contain some oil. There is no surface discharge into Clear Creek. Tar and other solid residues collected within the plant are transported to a dumping area located east of the City of Aurora, Colorado.

JOLLY RANCHER CANDIES, INC.
5060 Ward Road
Wheatridge, Colorado

Date of Visit: August 28, 1964

Persons Contacted: F. C. Hilker, Vice-President
J. Kopp, Plant Manager
Bud Phelps, Office Manager

Discussion: The Wheatridge plant of the Jolly Rancher Candies, Inc. manufactures various candies and confectionary products. The Company employs 140 persons on a two-shift operation over 5 working days a week. Total plant water supply averaging 2,000 gallons per day is obtained from the City of Denver via the Valley Water District. Major water uses are in candy-making, the cooling of taffy products, and domestic needs. Plant wastes originate from the washing and cleanup of equipment and floors, possible spillage, and domestic sewage. The Company provides no in-plant recovery or treatment of waste products. All processing wastes and domestic sewage are discharged to the sanitary sewers of the Fruitdale Sanitation District.

KOPPERS COMPANY, INC.
FOREST PRODUCTS DIVISION
5601 Fox Street
Adams County, Colorado

Date of Visit: July 1, 1964

Person Contacted: Paul Gibson, Plant Superintendent

Process and Operation: The Adams County plant of the Koppers Company, Inc. is primarily devoted to preservation techniques applied to wood and wood products. Products receiving treatment consist mainly of railroad ties, utility poles, fence posts, and selected lumber. There are four basic wood-preserving solutions in use including creosote, wolman salts, pentachlorophenol, and a mixture of creosote with petroleum oil. Normal practice involves the high-pressure injection of a preservative solution into the particular wood products receiving treatment. Standard operation requires the services of 30 to 35 employees, but on occasion the total staff may be expanded to between 50 and 52 persons. The establishment functions 24 hours a day, 5 and one-half days a week, throughout the year.

Sources and Uses of Water: Total plant water supply averages 17,000 gallons per day which is obtained from a single Company well, 600 feet deep. Major water uses are in cooling, boiler makeup and domestic needs. The factory maintains a separate pond for the recycling of cooling waters through the plant.

Sources and Characteristics of Wastes: Processing wastes consist of small amounts of preservative solution escaping from the treatment process together with other residues, wasted cooling water, and condensates from the steam-cleaning operations. The first waste is characterized by the presence of oils and tars. Remaining liquids are relatively clear in appearance.

Treatment and Disposal of Wastes: Processing wastes are released into two circular concrete basins, which receive the effluents on an alternate basis. One basin is 100 feet in diameter and the other is 150 feet in diameter. Liquid operating depth is maintained at about 3 feet. The basins receive periodic skimming for the recovery of surface oils which are applied to the various roadways in the plant vicinity. The basins are emptied and cleaned of debris several times yearly. Settleable sludges are removed and buried on the plant property.

Overflows from the basins are discharged to a low-lying area adjacent to the establishment and these liquors percolate into the ground. Surface runoff drains from the plant also empty to this area. There is apparently no surface discharge into a receiving stream. Domestic sewage is directed into a cesspool adjacent to the establishment.

Since there is the possibility that groundwater pollution may be occurring in the local area, it is strongly suggested that the Koppers Company plant provide for the installation and maintenance of monitoring wells to determine existing water quality of the groundwater and changes that may be occurring in the future. A minimum of two wells are preferably indicated for this purpose. This program should also include quality monitoring of the final waste discharges.

THE LARSEN-KILPATRICK COMPANY
2740 South Platte River Drive
Englewood, Colorado

Date of Visit: March 19, 1964

Persons Contacted: William Kilpatrick, Plant Engineer
Mrs. Roorda, Secretary

Process and Operation: The Larsen-Kilpatrick Company is a consulting engineering firm which directs a large part of their services into chemical research and extensive laboratory analyses. Special services include techniques on reducing corrosion in water-well piping. The Company consists of a total of seven persons.

Sources and Uses of Water: Waters for washing and cooling purposes are obtained from a single well. These waters are considered to be relatively high in mineral content and unsatisfactory for needs of high quality. Bottled water is relied upon for drinking purposes.

Sources and Characteristics of Wastes: The Company uses relatively small amounts of water and therefore produces small volumes of wastewater. However, these wastes are of diverse character and may at times contain high levels of serious pollutants. A letter transmitted from the Company to the Colorado State Department of Public Health in June 1960 indicated that the plant wastewaters would consist of spent cleaning solutions such as acids, bases, wetting agents, detergents and miscellaneous. According to this information, it was not likely at that time that the waste volume from the plant would exceed 1,000 gallons per day.

Treatment and Disposal of Wastes: Effluents are discharged to a small asphalt-lined pond which serves as a mixing and neutralization basin. An unusual arrangement has been made with the City of Englewood whereby the overflow liquors from the pond are connected into the outfall discharge line leading from the Englewood sewage treatment plant to the South Platte River. The reports in the files of the Colorado State Department of Public Health show that the Company has promised to notify the State in the event the pond is to be used for waste neutralization, or unusually large amounts of wastewater are to be discharged.

The wastes disposal picture at the Larsen-Kilpatrick Company is not sufficiently clear as to the amounts and character of wastes released into the City of Englewood outfall. The Company should inaugurate a program whereby continuing data is provided to the State on the nature of waste disposal and particularly on the volume and quantitative strength of wastes actually discharged to the outfall. Only then can a proper determination be made to permit the present effluents into the South Platte River, or require further treatment of these wastes. The connection to the sewage treatment plant outfall appears to have some disadvantages in terms of waste control and surveillance.

MARATHON OIL COMPANY
RESEARCH CENTER
7400 South Broadway
Littleton, Colorado

Date of Visit: September 2, 1964

Persons Contacted: Don Unvert, Personnel and Technical Information
Section
Tom Gleason, Shop and Building Services Section

Process and Operation: The research Center of the Marathon Oil Company located in Littleton, Colorado is involved in petroleum research which includes exploration, production, and refining of petrochemicals. Operations are essentially on an 8 hour daily schedule, 5 days each week, although there is some night work. The Company employs 270 persons of which 240 are engaged in the normal daytime shift.

Sources and Uses of Water: The plant water supply is received from two deep wells and the Denver water system. The first well is 1,800 feet deep and provides approximately 10 million gallons over the year for lawn irrigation and fire protection. The second well is 1,100 feet deep and the water obtained from this source is employed for domestic needs, kitchen facilities, boiler makeup, air-conditioning, laboratory facilities, and for washing and cleaning. The second well supplies an average of 22,000 gallons of water per day. The Denver water supply which is directed to various needs, amounts to 13,000 gallons per day.

Sources and Characteristics of Wastes: Relatively small quantities of diverse chemical wastes originate from the laboratories. Other wastewaters include spent air-conditioning waters, boiler blowdown, floor and equipment washings, culinary discards, and domestic sewage.

Treatment and Disposal of Wastes: Laboratory wastes are released into a detention tank where non-miscible oils and other materials are separated and removed. The tank overflow is then released to the sewer. All processing, culinary, and domestic wastes are discharged to the sanitary sewers of the South Arapahoe Sanitation District which in turn are connected to the City of Englewood sewage treatment facilities. Excess crude oil and undesirable by-products within the Marathon Oil Company plant are collected into drums and sold to an oil reclaiming company.

METRON INSTRUMENTS, INC.
5300 South Delaware Street
Littleton, Colorado

Date of Visit: August 26, 1964

Person Contacted: Kenneth Champney, Maintenance Engineer

Process and Operation: The Littleton, Colorado plant of Metron Instruments, Inc. manufactures precision electronic instruments, tachometers, miniaturized speed reducers, and automatic control devices. The plant provides for the assembly of parts and components received from other companies. The establishment employs from 45 to 50 persons in manufacturing, engineering, administration, and sales.

Sources and Uses of Water: Total water supply is received from the City of Littleton. Over the period September 1963 to September 1964, water use approximated one million gallons. Water is primarily directed to domestic needs and cleanup purposes. Only small amounts of water are employed directly in processing.

Sources and Characteristics of Wastes: The Company provided the following data on wastes produced within the plant:

- 2 oz. per week of cyanide salts from the washing of gears
- 1 pint liquid detergent per week
- 1 pint toilet bowl cleaner per week
- trace of hydrochloric acid from the bright dip vats for cleaning brass
- traces of lacquer thinner and mineral spirits
- trace of nitric acid from the etching of metal

Treatment and Disposal of Wastes: The plant has no facilities for on-site recovery and treatment of wastes. All industrial effluents together with domestic sewage are totally discharged to the municipal sanitary sewers.

Runoff from the roof and surrounding terrain drains into a small pond approximately 75 feet in diameter, located directly west of the plant. This pond also receives overflow from the lake on the C. A. Norgren Company property. The small pond has a vertical overflow pipe and at the time of visit the liquid level in the pond was 3 to 4 inches below the escape level. Discharge when occurring, would enter a ditch which apparently flows to Big Dry Creek. The report on the C. A. Norgren Company (see page A-33) contains information on waste flows within the ponding system.

NATIONAL FOOD STORES, INC.
Packinghouse Plant
5800 Welby Street
Adams County, Colorado

Date of Visit: June 11, 1964

Persons Contacted: Jim Grelman, Comptroller
Elmer Ingram, Chief Engineer

Process and Operation: The National Food Stores, Inc. owns and operates a packinghouse for beef products at the Welby Street location. It is noted that the Company also maintains a meat processing plant in north Denver at 4200 Brighton Boulevard. The Denver establishment is discussed in another report.

Basic operations at the Welby Street plant consist of slaughtering, processing of various meat products, and the rendering of edible and inedible materials. Processing followed by cleanup extends over the hours of 7 AM to 9 PM; rendering is conducted over a 12-hour period starting after there is sufficient accumulation of meat scraps and bone from the slaughtering and processing operations. The establishment employs approximately 10 persons in the office and 195 persons in the actual processing. During the average day, the plant handles about 400 cattle. Meat products are distributed to the chain stores of the Miller's Super Markets.

Sources and Uses of Water: Plant water supply is received from two wells, and the City and County of Denver. The first well, 40 feet deep with a capacity of 125 gpm supplies water for the cattle feedlot area and cooling of the refrigerant solution in the ice-house. These cooling waters after use serve as the condensate body for the cookers in the rendering operations.

The second well, 810 feet deep with a capacity of 50 gpm provides water for overall purposes within the plant including washdown of equipment and floors. Lastly, the Denver water supply is used for domestic needs and miscellaneous.

Sources and Characteristics of Wastes: Liquid wastes from the National Food Stores, Inc. establishment are typical of those expected of a packinghouse. Wastes originate from the kill area, the various processing steps, and from the rendering operations. The Company collects blood, meat scraps and other waste solids from the slaughtering and processing areas for use as raw material in rendering. Accordingly, waste load to the sewer is reduced. The outside holding pens which are concrete paved, are cleaned on a routine basis and the resulting manure washings are directed to the plant sewers. Previously collected data indicated that total plant wastes approximated 81,000 gallons per day with a BOD

strength of 4,000 mg/l. Daily waste load was estimated in the order of 2700 pounds of BOD per day or 16,000 population equivalents.

Treatment and Disposal of Wastes: Paunch manure is removed from the cattle by washing and subsequently flows into a 6x6x12 foot tank. Part of the paunch contents is separated from the wastewater represented by the settleable solids at the bottom of the tank. These solids are recovered and sent to the E & H Fertilizer Company. Total plant wastes near the point of leaving the establishment are discharged into a 30 by 11 by 8.5-foot deep tank providing 6 to 12 hours waste detention. This large tank is equipped with mechanical devices for continuous removal of settleable solids and grease. The solids are transported to a local fertilizer company and the grease is returned to the rendering process.

The industrial wastes after settling and the domestic wastes after passing through a septic tank, are totally released into the sewers of the North Washington Water and Sanitation District. According to plant personnel there can be no bypass of waste effluents to the River although a number of pipes exit from the west bank of the River which presumably received drainage from the National Food Stores packinghouse at some time in the past.

The Company was expecting completion of a new rendering facility in September 1964. Modifications are planned in the design of the rendering cookers to reduce organic entrainment in the vapors. These improvements plus others are intended to lower the waste load entering the District sewers. In conjunction with these changes, the Company will request permission to discharge spent cooling waters from the rendering operations directly to the South Platte River, rather than to the North Washington Water and Sanitation District.

C. A. NORGREN COMPANY
5400 South Delaware Street
Littleton, Colorado

Date of Visit: August 26, 1964

Person Contacted: J. S. Machen, Vice-President of Manufacturing

Process and Operation: The C. A. Norgren Company manufactures various types of pneumatic equipment, including air-line drain filters, lubricating and air-control valves, spray-lube systems for metal working, and other control units. The plant produces most of the cast items, fittings, and plastic parts for its line products. Operations are conducted on a two-shift basis, 5 days per week. The Company employs 280 persons engaged in manufacturing, production, administration, and sales.

Sources and Uses of Water: The majority of plant water supply is received from the City of Littleton which approximated 200,000 gallons over the period June 1963 through June 1964. Supplemental water is obtained from two Company wells about 700 feet in depth with a combined capacity of 200 gpm. The amounts of water actually used from the well system are not known. The well water supply does not receive treatment but is subjected to routine quality testing by the Tri-County Health Department when utilized for domestic purposes. Water uses are in processing, process cooling, air-conditioning, domestic needs, and lawn irrigation.

Sources and Characteristics of Wastes: Major wastes consist of spent cooling waters from the zinc die-casting machines, wastewater from the plating operations and plastics manufacturing, boiler blowdown, sanitary sewage, and runoff from the roofs, parking lots and surrounding terrain.

Treatment and Disposal of Wastes: Liquid wastes from the plating and plastics processes are collected with domestic sewage and released to the sanitary sewers of the City of Littleton.

Cooling water from the zinc die-casting machines, boiler blowdown and runoff flows are discharged into a lake located directly west of the plant. The lake has a surface area of about one-half acre, and a maximum depth of 12 feet. The influent to the impoundment was observed to be relatively clear in appearance. The lake overflows to a small pond located directly west of the Metron Instruments, Inc. plant previously described. At the time of visit, there was a small amount of flow between the lake and pond but no overflow from the pond. The discharge from the pond, if such does occur, would apparently enter Big Dry Creek.

Overall review of the waste disposal practices at the Littleton plant of the C. A. Norgren Company would seem to indicate that the lake should receive only runoff water, or otherwise be operated as a closed

system for possible recycling of cooling water through the plant, if desired. All other wastes should be discharged to the municipal sewers with in-plant treatment of special wastes not presently amenable to the sewers.

ORIENTAL REFINING COMPANY
4781 East 52nd Avenue
Commerce City, Colorado

Date of Visit: April 15, 1964

Person Contacted: Johnson Mossman, Plant Superintendent

Process and Operation: The Oriental Refining Company operates a petroleum refinery in the Commerce City area. Processing includes crude topping and thermal cracking. The crude oil input is primarily received by pipeline from the Wyoming oil fields. The crude generally varies from 0.0 to 0.2 percent sulfur by weight, although the level may at times reach as high as 1.0 percent. Average crude input is approximately 2,800 barrels per calendar day. Other raw materials are 2,000 pounds per month of 50 percent caustic soda, 150 pounds of anhydrous ammonia every 8 to 10 weeks, and 100 pounds of internal boiler compound required every 30 days.

The refinery produces motor fuel, diesel engine oil, kerosene, stove oil, residual fuel oils, and furnace oils. Furnace oils are used internally within the refinery as fuel for its own boilers. The refinery is in operation 24 hours a day, 7 days per week. Shutdown occurs 2 to 3 times a year, and each shutdown extends from 10 to 12 days. This is due to cleaning of the thermal cracking unit required about every 4 months. The Company employs 34 persons of which 28 are located within the refinery. Fifteen persons are present on the daytime shift and the remainder are engaged on the afternoon, night and weekend shifts.

Sources and Uses of Water: Plant water supply is obtained from two shallow wells and two deep wells. The shallow wells are 45 feet deep with a combined capacity of 600 gpm. Actual use from the shallow wells ranges from 300 to 500 gpm and this water is employed in process cooling on a once-through basis.

The other two wells are 700 feet deep with a combined capacity of 150 gpm. Actual use from the deep wells ranges from 80 to 100 gpm. This water after treatment is used for fire protection, boiler makeup, domestic needs, and cooling. Part of the supply is recirculated and re-used. Actual plant use from the total of the four water wells approximates 500 gpm or 720,000 gallons per day.

Sources and Characteristics of Wastes: The majority of wastewater volume consists of spent cooling water. Other wastes include caustic soda released from the caustic stripper, boiler blowdown, oils from the pump glands and other sources, spillage, and washings from equipment and floor cleanup.

Treatment and Disposal of Wastes: The spent process cooling waters originally associated with the shallow well supply after one cycle through the refinery are discharged into two earthen settling ponds, connected in series. The first pond is 40 by 150 feet, and the second is 40 by 40 feet. Liquid operating depth is maintained at 5 feet. The spent cooling waters entering this pond system have a flow between 300 and 500 gpm. Two other waste lines discharge into the ponds. These are the boiler blowdown and the effluent from the oil separators.

Two oil separators operating in parallel receive spent caustic solution originating from the gasoline treatment process, and oily wastes from the pump glands, floor drains and other sources. The separators are respectively 6x4x8 feet and 6x20x8 feet in size. Underflow from the separators or traps as these may be termed, amounts to about 25 gpm and is directed to the two settling ponds as described above. The traps are skimmed every second day and the collected oils are returned to the crude topping unit. Sludges are removed by draining the separators about once a year and this material is transported to a dumping area. Domestic sewage is segregated and released into a cesspool followed by a leaching field.

The combined plant wastes after settling in the two small earthen ponds are discharged into Sand Creek. Floatable oils on the surface of the ponds are collected and returned to the refinery.

The waste effluents from the Oriental Refining Company should have been sampled as part of the Industrial Wastes Survey conducted in the Denver metropolitan area. Recommendations on waste disposal and treatment should be somewhat similar to those previously given for the Continental Oil Company, the Empire Petroleum Company, and the Tenneco Oil Company, all located in the Commerce City area.

Recent information indicates that the Oriental Refining Company ceased operations during 1964. The plant is not due to reopen because of adverse economic conditions.

POWER EQUIPMENT COMPANY
500 East 62nd Avenue
Adams County, Colorado

Date of Visit: September 11, 1964

Persons Contacted: O. C. Sponsler, Vice-President
James Frank

Process and Operation: The Power Equipment Company essentially repairs and reconditions various types of equipment used in the road construction industry. The plant is in operation 8 hours a day, 5 days each week. Total staff consists of 55 persons including sales personnel.

Sources and Uses of Water: Total water supply is obtained from the North Washington Water and Sanitation District. Major water uses are in boiler makeup, steam-cleaning of equipment and machinery, and domestic needs.

Sources and Characteristics of Wastes: The major plant wastes originate from the steam-cleaning operations and from a degreaser employed in the cleaning of parts. These wastewaters contain road dirt, oils, solvents, caustic, and grease.

Treatment and Disposal of Wastes: Industrial wastes are released into a settling basin located on the plant property. Waste liquors are apparently eliminated in large measure by evaporation. The solids carried in the effluents have likely reduced seepage from the bottom of the pond and also, there is no reported overflow from the pond.

Domestic wastes from the plant are totally discharged to the sanitary sewers of the North Washington Water and Sanitation District.

PRINCETON DAIRY
6000 York Street
Adams County, Colorado

Date of Visit: September 3, 1964

Persons Contacted: Rory Miller
John Miller

Process and Operation: The Princeton Dairy processes and packages milk for sale in their retail store and also for home delivery.

Sources and Uses of Water: Total water supply is obtained from two wells. A shallow well, 30 feet deep provides water for barn washing, lawn irrigation, the condenser and ice machine, and corral drinking needs. The corral holds 300 dairy cows. The second well is 800 feet deep with a water usage between 5,000 and 6,000 gallons per day. This water supply is used for the bottle washer, cleaning of floors and equipment, and for domestic needs.

Sources and Characteristics of Wastes: Industrial wastes consist of milk and milk solids lost from spillage and cleaning, soaps and cleaning solutions, and manure and dirt from the barns.

Treatment and Disposal of Wastes: The Dairy provides no on-site recovery or treatment of wastes. Industrial and domestic wastes, excluding runoff from the holding pens, are totally discharged to the sanitary sewers of the North Washington Water and Sanitation District.

RAGSDALE BROTHERS TOOL AND DIE, INC.
4535 South Santa Fe Drive
Englewood, Colorado

Date of Visit: September 8, 1964

Person Contacted: E. W. Ragsdale, President

Process and Operation: The Ragsdale Brothers Tool and Die, Inc. operate a machining and metal fabricating plant. The Company provides general machine work, design and development of special machines and tools, rubber molds, and structural and other types of fabrication. The plant functions 19 hours a day, 5 days each week. Eighty-five persons are employed on the day shift whereas 15 are present on the night shift.

Sources and Uses of Water: Total water supply is received from the City of Englewood. Major water uses are machine cooling, boiler makeup, and domestic needs.

Sources and Characteristics of Wastes: Wastewater volumes are reported to be minimal. The waters and oils used in the cooling of machines are recycled and reused.

Treatment and Disposal of Wastes: Solvent and oily wastes from the degreasing operation, boiler blowdown, steam-cleaning wastewaters, and other used oils from the plant are all discarded and disposed of onto the ground on Company property. The disposal site is of such nature as to preclude surface drainage from this area to the South Platte River. Domestic sewage is released into the sanitary sewers of the City of Englewood.

Because the waste dumping area may be creating aesthetic disturbances and nuisances and secondly, there is the distinct possibility of ground-water pollution, it is suggested that the Company develop other means for disposing of its industrial wastes. The discarded materials may be collected and sold to a commercial recovery company. If this is not feasible, in-plant treatment and discharge of the remaining wastes to the sanitary sewers may be advised. Other solutions are also possible.

ROBINSON BRICK AND TILE COMPANY

Plant No. 1: 500 South Santa Fe Drive
Denver, Colorado

Plant No. 2: 3001 South Platte River Drive
Englewood, Colorado

Date of Visit: January 27, 1966

Persons Contacted: A. C. Jackson, Vice-President
James Clark, Manager, Research and Development

Process and Operation: The Robinson Brick and Tile Company manufactures structural clay products mainly in the lines of face brick and glaze tile. The basic raw material consists of inorganic clay (s). The two plants are in operation 8 hours per day, 5 days a week. The Company generally employs between 250 and 300 persons.

Sources and Uses of Water: Both plants receive water supply from the City and County of Denver. In addition, the Denver establishment obtains supplemental water from a single well. Water is mixed with the clays to give a stiff consistency in the extruders and also to produce a slurry for the glazes. Average water utilization at the Denver factory approximates 32,000 gallons per day, whereas the Englewood factory uses about 21,000 gallons per day.

Sources and Characteristics of Wastes: Limited information was obtained on waste sources and characteristics. The important wastes apparently originate from the glazing operations. These wastewaters contain inorganic clay, organic binders, and metal oxides from the coloring process.

Treatment and Disposal of Wastes: Processing wastes receive no treatment at either plant and are discharged into storm sewers entering the South Platte River. The Denver plant is connected to the 52-inch outfall entering the South Platte River from the right side opposite Exposition Avenue at RM 321.7. The waste flow from this outfall was sampled as part of the Outfall Waste Sampling Program and is described in the main report by the Map Identification No. 9. The Englewood plant is connected to the 24-inch outfall entering the South Platte River from the left side, 550 feet north of Dartmouth Avenue at RM 325.0. The waste flow from this outfall was also sampled as part of the Outfall Waste Sampling Program and is described in the main report by the Map Identification No. 2.

The domestic sewage from both establishments is released into the sanitary sewers of the City and County of Denver. Solid wastes are collected and transported to a dumping area.

The waste disposal practices at both plants of the Robinson Brick and Tile Company cause serious pollution of the waters of the South Platte River. The storm sewers previously described, although containing waste flows from other sources are believed to reflect in large degree, the discharges from the Robinson Brick and Tile Company plants. Storm Sewer "No. 9" with 0.22 MGD of waste flow, showed 2,060 mg/l TSS, 50 mg/l VSS, and 7.5 ml/l settleable solids. Storm Sewer "No. 2" with 0.02 MGD of waste flow, showed up to 55,700 mg/l total solids, 3700 mg/l total volatile solids, and 12.0 ml/l settleable solids. Substantial amounts of solids are being placed within the storm sewers and subsequently to the South Platte River.

In view of the seriousness of the overall stream pollution problem existing in the South Platte River Basin, this Company in addition to many others, must of necessity, reappraise their position on industrial waste abatement and treatment. In this case, process wastes routed to the storm sewers should receive proper treatment for removal of suspended solids, metallic compounds, and color, and preferably the effluents should then be diverted to the sanitary sewers, if at all possible. As the first step in this direction, the Company should inaugurate a program whereby continuing and extended data is provided to the State on the nature of waste disposal, and particularly on the volume and quantitative strength of wastes discharged at present, into the respective storm sewers.

SEALTEST FOODS
DIVISION OF NATIONAL DAIRY PRODUCTS CORPORATION
1325 West Oxford Avenue
Englewood, Colorado

Date of Visit: June 18, 1964

Person Contacted: William W. Moore, Manager

Process and Operation: The Englewood plant of Sealtest Foods processes and manufactures dairy products including fluid milk, cottage cheese, ice-cream, sherbets, and non-carbonated fruit drinks. The Company operates a receiving station for the receipt of raw milk brought in by tank trucks. The raw milk is temporarily stored in large tanks at the plant site. Raw milk before processing is sampled and weighed. Milk processing consists of clarifying, pre-heating, pasteurization, and packaging of the final product. Other processing includes the separation of skim milk and cream from the raw milk, and the manufacture of cottage cheese, ice-cream and associated products.

The plant is in operation 24 hours a day, 5 days a week. The Company employs a total of 125 persons in manufacturing, administration, sales and delivery.

Sources and Uses of Water: Total plant water supply is obtained from the City of Englewood. Water which is directed to the washing of cheese whey and cooling vats is chlorinated before use, to a residual of 5 mg/l chlorine. Other water uses are in the cooling tower, rinsing, cleanup of equipment and floors, boiler makeup, and domestic needs.

Sources and Characteristics of Wastes: Spent flows originate from the washing of cheese whey, vat and tank rinsing, boiler and cooling tower blowdown, spillage, general plant cleanup, sewage from domestic uses, and miscellaneous.

Milk is packaged in paper containers thereby eliminating wash-water from the cleaning of glass bottles. Tanks are washed with an alkali solution, whereas equipment running hot such as the pasteurizer, require an acid cleaning solution followed by an alkali solution. Acids and alkalis are present in the cleanup wastes. Spoiled milk products are separately collected and sold as animal feed. However, fruit drinks rejected on the production line are discharged to the plant sewers. This amounts to less than one percent of production.

Treatment and Disposal of Wastes: The establishment provides no in-plant recovery or treatment of wastes. All process wastewater and domestic sewage are released to the sanitary sewers of the City of Englewood. Total plant effluents received by the City of Englewood in 1963 were estimated to average 56,000 gallons per day.

SHOENBERG FARMS, INC.
7255 Sheridan Boulevard
Westminster, Colorado

Date of Visit: August 27, 1964

Persons Contacted: Edward M. Tepper, President
Jerry Tepper

Process and Operation: The Shoenberg Farms, Inc. processes, packages and sells milk and cheese products. In addition, a dairy herd is maintained at the Farms.

Sources and Uses of Water: Plant water supply is obtained from three wells ranging in depth from 525 to 550 feet, providing a total of 10,000 to 15,000 gallons of water per day. The principal use of water is for cleaning and washing of equipment and floors. Additional water is employed for boiler makeup, cooling purposes, and domestic and sanitary services. Rinse water from the cleaning of milk storage tanks and pasteurization equipment is reused as drinking water in the corrals.

Sources and Characteristics of Wastes: The majority of wastewater is derived from the cleaning of equipment and from spillage. These wastes consist of milk solids, cheese and whey inadvertently lost in processing.

Treatment and Disposal of Wastes: Boiler blowdown and spent cooling waters from refrigeration are used for crop irrigation. The remaining wastes are completely discharged into the sanitary sewers of the Westminster Sanitation District.

SIGMAN MEAT COMPANY, INC.
6000 West 54th Avenue
Jefferson County, Colorado

Date of Visit: June 24, 1964

Persons Contacted: Ralph DeShea, Operations Manager
Al Place, Plant Maintenance Supervisor

Process and Operation: The Sigman Meat Company, Inc. owns and operates a packinghouse in the vicinity of Arvada, Colorado providing processing for a wide variety of meat products. Beef cattle only are received by the slaughtering operations whereas processing is conducted both on cattle and hog carcasses for beef and pork products. The hogs are slaughtered at another location. The plant has no facilities for rendering.

The Sigman Meat Company, Inc. receives and processes 700 to 800 cattle (live) per week, and 5,000 to 6,000 hogs (carcasses) per week. The plant normally operates 5 to 6 days per week with daily activities extending from 6:30 AM to 5 PM or later. The Company employs 33 persons in the office, and 458 persons in the other departments which include the processing plant, truck-driving, and sales.

Sources and Uses of Water: Total water supply is received from four wells of which one is currently on shutdown. The wells are 640 feet deep with individual capacities of 100 gpm. Plant water usage is estimated at 300,000 gallons per day.

Sources and Characteristics of Wastes: Process wastes from the Arvada establishment are typical in many respects of those expected of a packinghouse exclusive of rendering facilities. The spent waters from the kill area, cutting, various processing and curing procedures, and from cooling within the plant are quite high in organic and solids content, settleable matter and grease. Blood is separately collected and delivered to the Meinerz Blood Dehydrating Company of Denver. Paunch manure after washing is passed through a 20-mesh vibrating screen and the solids are disposed of to local farmers or other outlets. Meat scraps, fatty parts and bones are salvaged and sent to the Denver Rendering Company.

Previous information on characteristics of plant wastes is contained in a 1962 study and report prepared for the Company by Kirkham, Michael and Associates, Engineers - Architects. The following data was considered representative of average daily operations: 5 day BOD - 3,570 lbs./day; total suspended solids - 1,690 lbs./day; volatile suspended solids - 1,590 lbs./day; grease - 1,430 lbs./day; and settleable solids - 1.5 ml/l. Wastes were discharged through two separate lines and measured separately. Line A contained 68 percent of the total wastewater volume whereas Line B amounted to 32 percent. The wastes in

Line A showed the following values: 2040 to 2870 mg/l BOD, 1190 to 1430 mg/l total suspended solids, and 870 to 1580 mg/l grease. Line B illustrated the following levels: 560 to 1020 mg/l BOD, 145 to 230 mg/l total suspended solids, and 160 to 175 mg/l grease. Sanitary sewage was included in the above wastes.

It is noted from the above report that the average BOD load per 1000 lbs. live weight cattle and per 1000 lbs. dressed weight hogs were estimated at 15 pounds and 9 pounds respectively. Suspended solids loads derived in similar fashion were 7.5 pounds and 4 pounds, respectively. These loads were obtained after wastes in Line A were passed through a grease floatation tank followed by a shaker screen, whereas Line B wastes passed through a grease catch basin. The report stated that appreciable amounts of blood and paunch manure were reaching the plant sewer which accounted for a significant portion of the BOD and suspended solids in plant effluents.

Combined plant wastes were also found to be quite high in pH level, ranging from 9.1 to 11.3. The average 24 hour and 12 hour peak rates of waste flow were 222,500 and 345,000 gallons per day, respectively.

Treatment and Disposal of Wastes: The majority of process wastes are directed into a rectangular tank equipped with mechanical devices for grease skimming and collection. These effluents then pass through a 20-mesh screen and are released to the sanitary sewers of the Clear Creek Valley Sanitation District. Remaining process wastes flow through a grease trap and enter the District sewers. Grease recovered from the treatment units is shipped to the Denver Rendering Company.

Domestic wastes are discharged directly to the sanitary sewer. Boiler wastes are disposed of onto the land surface and pen manure is removed and conveyed to local farmers. Lastly, spent cooling waters approximating 15 gpm on a continuous basis are disposed of into Clear Creek. Since no data is available concerning the characteristics of these excess cooling waters, appropriate information should be secured at the earliest possible time. Full and proper evaluation should be made in the future of this wastewater entering Clear Creek. In the event such discharge is approved, continuous quality monitoring should be established for the prescribed effluents.

SPEEDSTER COMPANY
15860 West 5th Avenue
Golden, Colorado

Date of Visit: August 28, 1964

Person Contacted: Philip C. Freitag, President

Process and Operation: The Speedster Company manufactures restaurant equipment primarily in the lines of electric plates and ovens. The plant normally operates on a schedule consisting of 8 hours per day, 5 days a week. At present time, the Company employs 20 persons.

Sources and Uses of Water: The entire plant water supply is received from the City of Golden. Major water uses are for cooling in the welding operations, a protective water curtain in the paint shop area, and for domestic needs. The water curtain is employed to filter paint droplets and gaseous fumes from the air.

Sources and Characteristics of Wastes: Major wastes are produced from the welding shop, the paint area, and domestic uses.

Treatment and Disposal of Wastes: The establishment provides no in-plant recovery or treatment of wastes. All process wastewater and domestic sewage are discharged directly to the sanitary sewers of the Pleasantville Sewage District which in turn connects to the Adolph Coors Company-City of Golden sewage treatment plant.

STANLEY AVIATION CORPORATION
2501 Dallas Street
Aurora, Colorado

Date of Visit: September 3, 1964

Person Contacted: Robert M. Stanley, President

Process and Operation: The Stanley Aviation Corporation manufactures airplane parts and equipment. The plant normally operates on a one-shift basis, 5 days a week, although at the time of visit, work was being conducted over the full 24 hours of the day. The Company employs 130 to 140 persons in production, engineering and administration.

Sources and Uses of Water: Plant water supply averaging 15,000 gallons per day is received from the City of Aurora. The water entering the establishment is directly used for sanitary services and as rinsing and makeup water for the plating processes. The spent rinse waters are routed to a pond, 50 by 100 feet, located on the northeast corner of the Company property. This pond also receives runoff from the surrounding area.

The pond waters are reused in the air-conditioning system at the plant, and are also utilized in lawn irrigation.

Sources and Characteristics of Wastes: The various wastewaters originating from the Stanley Aviation Corporation consist of rinse waters from the plating processes, domestic sewage, and runoff from the roofs, parking lots and surrounding terrain.

Treatment and Disposal of Wastes: All process wastewater is reported to be discharged into the Company pond described above. During the summer months, the air-conditioning and irrigation water demands made on the pond, preclude any pond overflow. During the cooler period of the year which was estimated to be of 6 months duration, there is definite overflow from the pond into Westerly Creek, a tributary to Sand Creek. The impounded waters were observed to be free of odor and relatively clear, although there was an abundance of green algal growth on the water surface.

The pond waters from all apparent evidence, are of relatively good quality. Nevertheless, it is recommended that the Company institute a water quality-testing program on the overflow waters into Westerly Creek, when occurring. This program should provide frequent and continuing data on the quantitative levels of waste constituents including metallics, that may be present in the discharges.

Domestic sewage from the establishment is collected separately and completely released to the sanitary sewers of the City of Aurora.

SUNSTRAND-DENVER
DIVISION OF SUNSTRAND CORPORATION
2480 West 70th Avenue
Adams County, Colorado

Date of Visit: June 12, 1964

Persons Contacted: Carl Smith, Manager, Plant Engineering
John Larsen, Staff Assistant to the Manager, Plant Engineering
Robert Boyd, General Foreman, Welding Shop and Heat Treating and Plating
Homer Waite, Superintendent of Maintenance

Process and Operation: Sunstrand-Denver basically provides general and specific machining and metal-finishing services, in the production of aircraft and guided-missile components. The Company also maintains a small electronics-testing operation and a small research laboratory. The plant conducts activities over a 5 and one-half day week, 12 months of the year. There are one, two, or three shifts within any given department, depending upon the type of operations carried forth by that department. The Company employs 1,000 persons of which 700 are engaged on the first shift, 200 on the second shift, and approximately 100 on the third shift.

Sources and Uses of Water: Plant water supply is received from two wells, one at 700 feet in depth and the other at 1200 feet. The waters from the two wells are combined as a single supply to the establishment. Water utilization over the year 1963 was 62 million gallons or an average of 217,000 gallons per day.

Sources and Characteristics of Wastes: Process wastewaters include cutting oils disposed of after cooling in the machining and drilling operations, washings from the deburring equipment, process and rinse waters from the plating and anodizing operations, and washings from the cleanup of floors and equipment. Other contributions are domestic sewage, culinary discards from the cafeteria, and relatively small amounts of waste from the plant laboratory and photographic room.

Treatment and Disposal of Wastes: The chromate and cyanide spent plating solutions are separately collected into 55-gallon steel drums and the drums are periodically trucked to the Rocky Mountain Arsenal for final disposal. Remaining wastewater from the plating and anodizing processes including various rinse waters are released into a tank neutralizing the waters with limestone, and the overflow is discharged to the sanitary sewers. Some chromium and cyanide remain in the overflow waters.

The cutting and lubricating oils after being used in cooling of the machining operations are separately collected and placed in a series of

underground storage tanks. The oils are pumped out of the tanks at periodic intervals and recovered by a commercial salvage company.

All remaining process wastewater which includes the overflows from the neutralization of plating rinse waters as described above, are discharged along with domestic, culinary and laboratory wastes to the sanitary sewers of the Baker Water and Sanitation District. Spent cooling waters from the air-conditioning system are an exception to this disposal pattern. The latter waters are released into a nearby storm sewer which terminates at Clear Creek. Unwarranted wastewaters other than the designated cooling waters should at all times be denied access to this storm sewer.

THOMAS PLATING COMPANY, INC.
4695 South Pecos Street
Englewood, Colorado

Date of Visit: September 2, 1964

Person Contacted: Rupert L. Thomas, General Manager

Process and Operation: The Thomas Plating Company, Inc. specializes in metal finishing which includes the plating, anodizing, and polishing of various metals and metal products. This work is performed for a host of manufactories in the Denver Metropolitan area. The plant is in operation 8 hours per day, 5 days a week, and employs a total staff of 23 persons.

Sources and Uses of Water: Total water supply for the establishment approximating 12,000 gallons per day, is obtained from the City of Englewood. Major uses of water are in the plating operations for the rinse tanks, spray baths, and makeup of plating solutions. Remaining water is directed to the various domestic needs within the plant.

Sources and Characteristics of Wastes: Wastewater from the plating rinse tanks and spray baths are discharged to the floor drains. Plating solution tanks are dumped only on rare occasions, and these liquors are also intercepted by the floor drains. Company officials stated that considerable dilution is provided in the waste-carriage system when the plating solution tanks are emptied and the contents are slowly bled into the system over a four-hour period.

Treatment and Disposal of Wastes: The wastewaters from the plating operations which enter the floor drains subsequently pass through two sumps, each approximately 2 feet in diameter and 10 feet deep, for the removal of solids. The sumps are periodically drained and the settleable solids are collected and transported to a public dumping area. All process wastewaters and domestic sewage from the plant are discharged directly to the sanitary sewers of the City of Englewood.

TIMPTE, INC.
DIVISION OF THE OHIO BRASS COMPANY
5990 Washington Street
Adams County, Colorado

Date of Visit: September 1, 1964

Persons Contacted: R. R. Ruland, President
S. R. Cockburn, Director of Personnel

Process and Operation: Timppte, Inc. fabricates and manufactures truck chassis. This work consists of bending, punching, cutting and riveting of aluminum, steel and wood materials. The Company employs 300 persons on a two shift basis, 5 days a week. Approximately 85 percent of the personnel work on the daytime shift.

Sources and Uses of Water: Total water supply is received from the City and County of Denver. Major water uses are in equipment and floor washing, the protective curtain in the painting room, steam-cleaning, air-conditioning, boiler makeup, and domestic needs.

Sources and Characteristics of Wastes: The waters used in the protective paint curtain are recycled in large degree. However certain wastes containing paint particles and miscellaneous originate from this area. Wastewater resulting from steam-cleaning contains mud, oils and paint particles. Various solvents from cleaning procedures throughout the plant enter the floor drains and comprise part of the total wastes.

Treatment and Disposal of Wastes: All industrial wastes and domestic sewage are released to the sanitary sewers of the North Washington Water and Sanitation District. These total discharges are estimated in the order of 3,000 gallons per day.

UNION PACIFIC RAILROAD
40th and Williams Street
Denver, Colorado

Date of Visit: August 20, 1964

Persons Contacted: Tex Williams, Car Foreman
W. E. Dent, Water Service Department

Process and Operation: Activities considered pertinent to the Industrial Wastes Survey included the railroad yards, maintenance shops, and associated functions of the Union Pacific Railroad within the Denver area. The Company owns and/or operates facilities at four locations: 40th and Williams Street, Brighton Boulevard, 23rd Street Viaduct, and the Denargo Market area.

Sources and Uses of Water: Company water is obtained entirely from the City and County of Denver. Water usage averaged over the first four months of 1964 is given as follows: 40th and Williams Street - 650,000 gallons per day; Brighton Boulevard - 1,000 gpd; 23rd Street - 12,000 gpd, and; Denargo Market - 151,000 gpd; for a total of 814,000 gpd.

The 40th and Williams Street location requires water for locomotive and car washing, boiler feed, engine overhaul and parts cleaning, floor and building cleanup, and domestic needs.

The Brighton Boulevard location employs water for washing stock cars and for miscellaneous needs.

The 23rd Street location utilizes the water supply primarily in the commissary, and the remaining water is used in the coach-car yard.

The Denargo Market area may be best described as a fruit and vegetable wholesale market which is owned by the Railroad. Water requirements are in cooling and refrigeration, floor and building washing, and domestic needs.

Sources and Characteristics of Wastes: Industrial wastewaters from the yard and maintenance shops at 40th and Williams Street may be described as oily wastes. The majority of effluents originate from the roundhouse. Other wastes are washings from the locomotives, rinse waters from paint stripping, and boiler blowdown. The oil drained from the engines is collected and shipped to Ogden, Utah for eventual reclaiming.

The Brighton Boulevard location contributes wastewater from the washing of cattle and stock cars together with domestic sewage. These combined effluents are probably similar in composition to strong domestic sewage.

The 23rd Street commissary and the Denargo Market dispose of waste food and spoiled produce. The wastewaters from these two areas would be expected to be similar in many respects to kitchen or domestic wastes with added garbage. Soaps and cleaning solutions are also reflected in the waste effluents.

Treatment and Disposal of Wastes: At the 40th and Williams Street location, most of the process wastewater and all of the domestic sewage are discharged to the sanitary sewers of the City and County of Denver. Unknown quantities of industrial wastes and surface runoff from the yards and buildings, however, drain into an adjoining storm sewer with access to the South Platte River.

All waste effluents from the Brighton Boulevard facilities are discharged to the local sanitary sewers.

At the 23rd Street location, all waste effluents from the commissary are directed to sanitary sewers but the surface runoff from the yards is permitted to enter an adjoining storm sewer which leads into the South Platte River.

In the Denargo Market area, floor washings are passed through a sand trap and are then discharged to the sanitary sewer. The wastes from the two restaurants together with all domestic sewage from the Market area are also placed into the sanitary sewer. Some refrigeration and cooling waters are however disposed of into an adjoining storm sewer which eventually enters the South Platte River.

The waste disposal picture at the four operational locations of the Union Pacific Railroad is a very difficult one to analyze. The results given by this study report are believed to represent only a preliminary evaluation on waste abatement practices used by the Union Pacific Railroad. Further study is necessary to assess both adequacies and future needs. Emphasis must be placed on the desirability of eliminating all waste discharges from the storm sewers, other than unpolluted cooling waters and strictly land surface runoff. This applies particularly to the 40th and Williams Street and 23rd Street locations. In addition, oils and other waste materials accumulated in the railroad yards should be prevented by suitable means, from entering into contact with surface runoff waters, that are permitted discharge to the storm sewers and the River.

WILKERSON CORPORATION
1201 West Mansfield Avenue
Englewood, Colorado

Date of Visit: September 2, 1964

Person Contacted: Harold Sampson, President

Process and Operation: The Wilkerson Corporation manufactures various components for compressed-air systems including filters, regulators, and lubricators. The products consist of cast items made by the plant, and plastic items which are supplied by various vendors. The establishment normally operates on a two-shift basis, 5 days a week. Total staff comprises 100 persons engaged in production, engineering, and administration.

Sources and Uses of Water: Plant water supply is received from the City of Englewood. Total water utilization over the calendar year 1963 amounted to 2.9 million gallons. Major water uses are in cooling of the zinc die-cast machines, the degreasing tank, the cleaning and tumbling machine, and domestic needs. Cooling of the die-cast machines probably represents the largest water use. In the degreasing tank, cooling water serves to form a cold air blanket over the trichloroethylene vapor for cleaning parts. This water does not come in direct contact with the vapor or the parts, and is used on a once-through basis. The cleaning and tumbling machine consists of a rotating steel drum containing gravel for the purpose of removing and washing away dirt, rust, and uneven surfaces from the fabricated parts.

Sources and Characteristics of Wastes: Plant wastes include spent cooling waters, cleaning waters, and domestic sewage. Wastewater from the cleaning and tumbling machine contains fine metal particles, dirt, and miscellaneous.

Treatment and Disposal of Wastes: Wastewater from the cleaning and tumbling tank is passed through a small settling tank, 5 feet by 1 foot by 6 inches deep, providing separation and removal of the heavier solids. All industrial wastewaters and domestic sewage are discharged to the sanitary sewers of the City of Englewood. Solid wastes accumulating within the establishment are separately collected and disposed of to a dumping area.

WILLIAMS REFINING COMPANY
5900 Federal Boulevard
Adams County, Colorado

Date of Visit: August 6, 1964

Person Contacted: Lloyd Cunningham, President

Process and Operation: The Williams Refining Company salvages, processes, and reclaims spent or used oils. The Company operates two plants. The main plant located at 5900 Federal Boulevard receives used oils from various aircraft and trucking companies, service stations, missile sites, and other sources in the Denver Metropolitan area. The second establishment is situated directly across the street from the main plant, and is known as the Rio Grande plant. The Rio Grande establishment receives and processes spent oils recovered from the Rio Grande Railroad. The combined staff at the two plants ranges from 8 to 10 persons.

Sources and Uses of Water: The Williams Refining Company main plant receives water both from a 200-foot well and from Clear Creek. The well can supply up to 100 gallons of water per hour which is utilized for boiler makeup and domestic needs. The intake from Clear Creek is rated at 1,000 gallons per hour and provides all necessary cooling water at the plant.

The Rio Grande plant obtains all required water from the City of Denver. Cooling waters at this location are continuously recycled and fresh makeup water is added when necessary.

Sources and Characteristics of Wastes: Various wastes from the Rio Grande plant consist of boiler blowdown, and sludge and tars originating from the process works.

Treatment and Disposal of Wastes: The Rio Grande plant disposes of boiler blowdown onto the adjoining grounds. Sludge and tars collected within the establishment are deposited at the edge of an abandoned quarry behind the plant property. There was definite visible evidence that oily wastes had seeped down the sides of the quarry into the standing water found at the bottom of the quarry.

The main plant at 5900 Federal Boulevard is reported to use Clear Creek waters for various cooling purposes within the operations. The nature and type of these operations is not known. The cooling waters are discharged after a single pass through the plant, i.e. no recirculation. Spent cooling waters are released into a ditch which enters Clear Creek at RM 4.5. At the time of visit, there was an oil slick visible on the waters within the ditch.

Domestic sewage from the main plant is disposed of into a septic tank. Boiler blowdown wastes are discharged onto the surrounding grounds. Tar and sludge residues separated from the incoming oils are collected and transported to the City dump.

The Outfall Sampling program concurrent with the Industrial Wastes Survey undertaken by the Project in the Denver Metropolitan area, provided pertinent data on the drainage ditch described above. This ditch is reported to receive waste flows both from the Aero Airplane Oil Company and the Williams Refining Company. The ditch was sampled on January 20, 1966, and is described in Table II of the main report by the Map Identification No. 60. The data showed a flow of 0.16 MGD containing 6,750 mg/l BOD, 48 mg/l TSS, 96 mg/l oils, and 14 mg/l ABS. Total waste loads were estimated as 9,000 pounds/day BOD, 120 pounds/day oils, and 18 pounds/day ABS. Very large waste loads are undoubtedly entering this ditch with extremely severe effects on the waters of Clear Creek. The majority of wastes found in the ditch are believed to originate from the Williams Refining Company.

It is recommended that detailed waste surveys be conducted in the future by the State of Colorado at both the Williams Refining Company and the Aero Airplane Company. The Williams Refining Company should take all necessary steps to recover within the plant, the large amounts of waste products particularly oils, presently discharged to the receiving stream. Strict limits should be set on the waste content of discharges to the ditch, if indeed any releases to the ditch may be permitted in the future. It is further suggested that the Company be required in the very near future to submit to the State, a plan for waste recovery and treatment which may solve the existing problems.

WRIGHT AND MCGILL COMPANY
1400 Yosemite Street
Aurora, Colorado

Date of Visit: September 3, 1964

Persons Contacted: Madeline F. McGill, President
Roland W. Ferguson, Plant Superintendent

Process and Operation: The Aurora plant of the Wright and McGill Company fabricates and manufactures various lines of fishing equipment, and specializes in the production of fishing hooks. The establishment is in operation 8 hours per day, 5 days a week, and employs 250 persons in production, administration and sales.

Sources and Uses of Water: Total plant water supply is received from the City of Aurora. Major water uses are in the plating processes for rinsing and makeup purposes; cooling requirements for the gas generators, heat-treating furnaces, and the degreasing machine; the cleaning and tumbling machines, and various domestic needs such as the lavatories, wash rooms, and drinking fountains. The plating operations represent the largest water use.

Sources and Characteristics of Wastes: Alkali solutions are added to the waters used in the cleaning and tumbling machine. Trichloroethylene is employed in the degreasing equipment for removing oil and grease from the products. The rinsing and spill waters from the plating operations contain traces of phosphoric, nitric, sulfuric and nickel acids, plus alkalis and salts.

Treatment and Disposal of Wastes: Solid waste materials including that from the bottom of the degreasing machine, are separately collected and disposed of to a dumping area. Process wastewaters and domestic sewage from the plant are completely discharged to the sanitary sewers of the City of Aurora.

REMAINDER OF BASIN

BACON CHERRY COMPANY
Masonville Route, RFD
Loveland, Colorado

Date of Visit: June 2, 1965

Person Contacted: Warren Wolaver

Discussion: The Bacon Cherry Company receives and processes cherries. The plant packs cherries for pies and also manufactures cherry cider. Operations are strictly seasonal extending from the middle of July to the first part of August each year. Total staff approximates 40 persons. Processing wastes are disposed of onto a field from which there is no possibility of surface return to the Big Thompson River. The sanitary sewage is discharged into a septic tank.

BUDD'S REDI-FRY
705 East 18th Street
Greeley, Colorado

Date of Visit: May 17, 1965

Person Contacted: Mrs. Budd Finch

Process and Operation: Budd's Redi-Fry processes and prepares blanched and raw french-fried potatoes, wrapped and unwrapped baked potatoes, boiling potatoes, and sliced potatoes, all for restaurant use. The plant is in operation 8 hours per day, 5 days a week, and employs about 20 persons.

Sources and Uses of Water: Total plant water supply is received from the City of Greeley. The principal use of water is in the washing and peeling of potatoes. Potatoes entering the process are soaked in a caustic solution that loosens the skin, and then water jets remove the peeling.

Sources and Characteristics of Wastes: The major process wastes originate from potato peeling, potato washing, equipment and utensil washing, and general plant cleanup.

Treatment and Disposal of Wastes: All processing wastes are discharged into a tank located at the rear of the plant. The liquid in this tank is permitted to seep into the ground with no subsequent overland flow. Domestic sewage is disposed of into a septic tank followed by a leaching field.

The possibility of groundwater pollution occurring in the local area adjacent to the Budd's Redi-Fry establishment should receive study in the future. Further information is necessary on the character and amounts of process wastes actually discharged to the ground and also on the nature and uses of the groundwater aquifer in the vicinity of the plant. The highly-preferred solution would be to discharge all plant wastes to the local sanitary sewer, if available.

CHERRY PRODUCTS COMPANY, INC.
541 Estes Park Road
Loveland, Colorado

Date of Visit: April 27, 1965

Persons Contacted: Robert M. Spenger, President
Mr. Neville, Vice-President

Process and Operation: The Cherry Products Company, Inc. has facilities for the washing, grading, and canning of cherries. Operations are strictly seasonal starting in mid-July each year and continuing from 10 to 14 days. The plant employs 32 persons on an eight-hour working day.

Sources and Uses of Water: Plant water supply is obtained from the City of Loveland and from a single Company well. City water is used for the pitting and washing of cherries. Well water which is chlorinated, serves to cool the cherries so as to minimize bruising and cutting in the pitting operation.

Sources and Characteristics of Wastes: Process wastes originate from equipment and floor washing, and cherry washing and pitting operations.

Treatment and Disposal of Wastes: Total process wastes are released into a settling basin for the removal of pits and solid materials. The collected solids are transported to a public dumping area. The overflow from the settling basin is discharged directly into the Big Thompson River.

The major suggestion on waste disposal at the Cherry Products Company plant is to exclude process wastes from the Big Thompson River. Ground disposal appears to be the best solution particularly since the plant is in operation for only two weeks of the year. Another means may be a connection to the local sanitary sewer, if available.

DREHER PICKLE COMPANY
Riverside Avenue
Fort Collins, Colorado

Date of Visit: April 22, 1965

Person Contacted: Tom Dreher, Plant Manager

Process and Operation: The Fort Collins plant of the Dreher Pickle Company receives and processes cucumbers for the production of dill, sour and sweet pickles. The cucumber crop arrives at the plant in the months of July, August, and September. The cucumbers will remain in the brine tanks for periods from six months up to three years. After proper curing, the pickles are shipped in bulk to another location for final packing. Since the level of operational activity varies greatly from the processing season as compared to the remainder of the year, the industry may be classed as mainly seasonal. When cucumbers are being received, the Company employs 100 persons on a 5 day work-week. During the off-season, plant operations requires the services of 18 full-time persons.

Sources and Uses of Water: Total plant water supply is obtained from the City of Fort Collins. Approximately 60 percent of the water is necessary for desalting the pickles. In this process, the pickles are subjected to soaking in fresh-water tanks with added live-steam to remove the excess salts.

During the spring and early summer, the wooden tanks that are not in use must be wetted-down and soaked, in order to prevent the wooden staves from drying-out and causing leakage. This procedure requires about 25 percent of the plant water supply. The remainder of water is used in the washing of cucumbers, preparation of the brine solutions, the washing of pickles, boiler makeup, and domestic needs.

Sources and Characteristics of Wastes: Various liquid wastes originate from the washing of cucumbers and pickles, cleaning of the pickle brine tanks (after proper curing) with a strong lime solution and then a vinegar solution, desalting of pickles, and cleanup of equipment and floors. The brines used in the curing of pickles are not dumped but however are recycled within the process.

Treatment and Disposal of Wastes: The washings of the cucumbers and pickles, plant cleanup wastes, domestic sewage, and wastes associated with the pickle tanks on the west side of the establishment approximating 120 in number, are collected and discharged to the sanitary sewers of the City of Fort Collins. The wastes associated with pickle tanks on the east side of the plant, approximating 180 in number, are permitted to drain into the Cache la Poudre River. The disposition of the spent desalting waters is not known. The Company separately collects its solid wastes, which largely consist of broken, mis-shaped and otherwise unusable cucumbers, and disposes of these wastes at the City dump.

The Dreher Pickle Company has expressed a great willingness to connect all plant wastes to the sanitary sewers of the City of Fort Collins, if permitted to do so. It is hoped that satisfactory arrangements may be concluded along these lines in the near future for the residual wastes presently discharged to the Cache la Poudre River. Depending upon the outcome of these deliberations, the Company may be required to install pre-treatment measures, or otherwise may experience the need for extensive waste recovery and treatment.

FORT LUPTON PACKING PLANT
Fort Lupton, Colorado

Date of Visit: May 17, 1965

Discussion: The Fort Lupton Packing Plant is a custom slaughterhouse receiving and processing about 15 animals per week. All wastes from the establishment are disposed of into two septic tanks. There is no direct discharge to the South Platte River or any other surface stream.

GETTMAN MEAT COMPANY
East 8th Street
Greeley, Colorado

Date of Visit: April 23, 1965

Person Contacted: Jake Gettman

Process and Operation: The Gettman Meat Company owns and operates a custom slaughterhouse which processes 10 to 12 beef cattle per week according to customers' specifications. The Company employs two or three persons who work a 5-day week.

Sources and Uses of Water: Plant water is obtained from a single Company well. Water supply amounting to less than 5000 gallons per day is used for carcass washing and general cleanup.

Sources and Characteristics of Wastes: Major wastes originate from killing, washing of the carcasses, and from equipment and floor cleanup. The wastewaters contain blood, grease, solids and other matter.

Treatment and Disposal of Wastes: Processing wastes are released to and contained within a 50-foot diameter pond adjacent to the establishment. Some odor was observed next to the pond at the time of visit. A previous outlet from the pond to the Cache la Poudre River has been sealed by the Company. The paunch manure is collected separately within the plant and buried on the Company property.

GOLDSMITH DAIRY
Greeley, Colorado

Date of Visit: May 17, 1965

Discussion: Entire waste effluents from the Goldsmith Dairy are disposed of into a septic tank. There is no direct discharge to any surface stream.

GREELEY MEAT COMPANY
East 8th Avenue
Greeley, Colorado

Date of Visit: April 23, 1965

Person Contacted: Dale Cassidy

Process and Operation: The Greeley Meat Company in Greeley, Colorado operates a custom slaughterhouse which receives and processes cattle, hogs and lambs. On the average week, the plant handles 39 cattle, 13 hogs and one lamb. The Company employs four to five persons who work a 5-day week.

Sources and Uses of Water: Plant water supply approximating 10,000 gallons per day is obtained from a single well. Important water uses are in carcass washing, cooling and general cleanup.

Sources and Characteristics of Wastes: Major plant wastes originate from the washing of carcasses and cleanup within the establishment.

Treatment and Disposal of Wastes: Baunch manure is separated in the processing, and collected and used as fertilizer. All industrial wastewater together with domestic sewage are released into a two-compartment, 21,000-gallon septic tank. The overflow from the septic tank is then discharged to an aerated lagoon. The lagoon which is L-shaped, 100 feet long on one side and 50 feet wide, was observed to have no overflow at the time of visit. An irrigation canal located adjacent to the lagoon would receive discharge from the lagoon, if in fact such does occur. In the event wastewater was directed to the canal, the quality of these effluents would be expected to conform to the general limits prescribed in the main report for all such industrial wastes entering Basin streams.

H. J. HEINZ COMPANY
Windsor, Colorado

Date of Visit: May 25, 1965

Person Contacted: Lloyd Lewis

Discussion: The H. J. Heinz Company in Windsor, Colorado processes pickles for shipment in tank cars to their main Company operations in Chicago, Illinois. There is no canning or bottling at this plant. All waste effluents from the establishment are discharged to the sanitary sewers of the town of Windsor.

IDEAL CEMENT COMPANY
BOETTCHER PLANT
Fort Collins, Colorado

Date of Visit: June 8, 1965

Person Contacted: George Thompson, Assistant Plant Manager

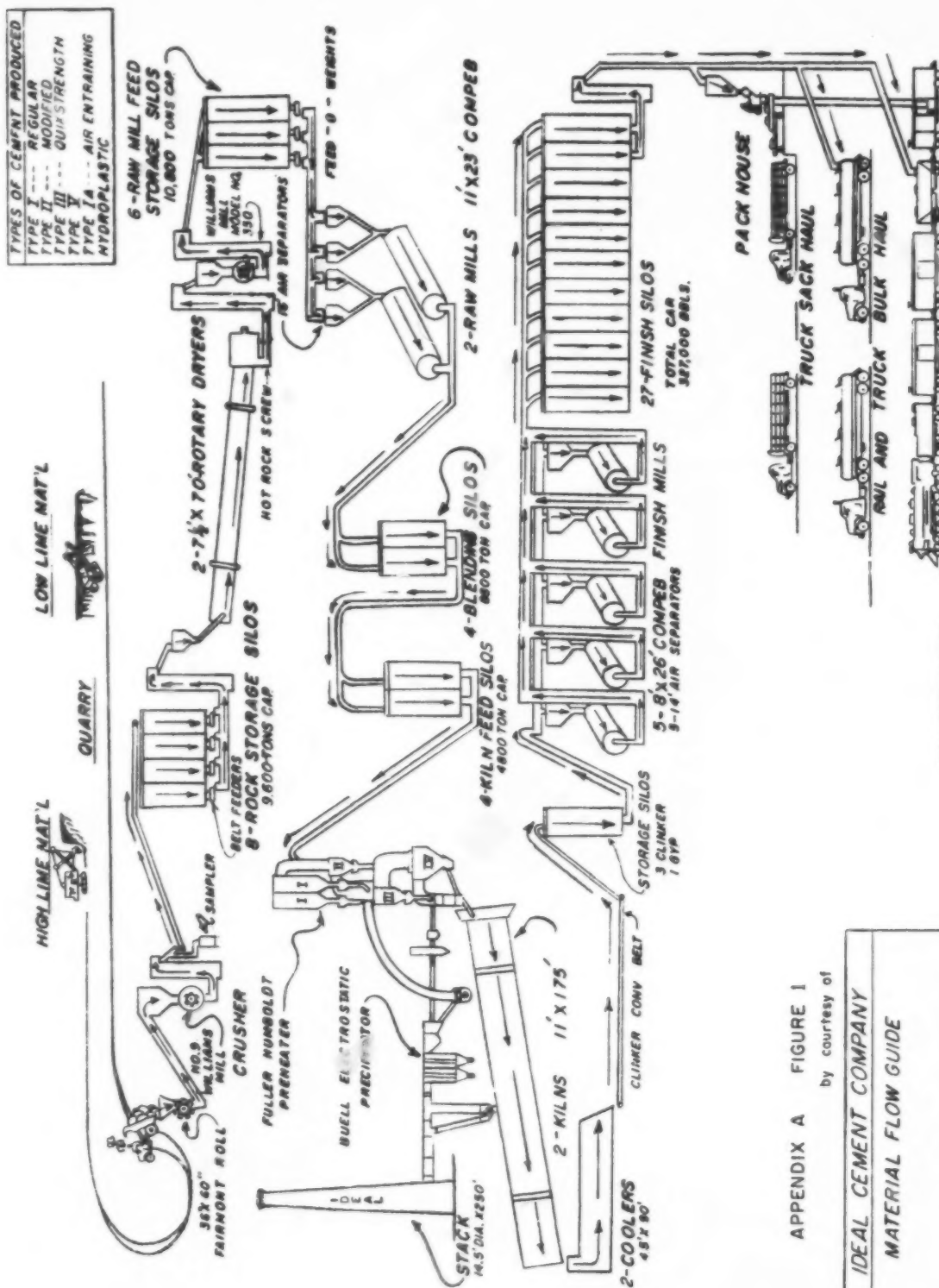
Process and Operation: The LaPorte-Fort Collins plant of the Ideal Cement Company operates a quarry for the extraction of lime materials, and is also engaged in the preparation and large-scale production of cement. The cement is distributed and wholesaled in sack and bulk form, by means of truck and rail transportation. The Company reports a total staff of 210 persons, with operations sustained over 24 hours of the day, 7 days a week. A schematic of the plant flow is included with this report.

Sources and Uses of Water: Plant water supply is obtained from the following sources: the Northern Colorado Water Association, the Larimer County Water Supply and Storage Company canal, the Big Thompson River, and Curtis Lake. The large majority of water is used in the cooling of cement product and the cooling of the large ball-bearings in the crushing and grinding mill. A basic component of the cooling water system is a concrete-lined pond 100 by 150 feet, by 10 feet deep. Water is collected in this pond and is also recirculated through the pond for various cooling purposes within the cement manufacturing plant. The makeup water added to the pond approximates 200 gpm, and the water recirculated through the pond approximates 800 gpm. The water received from the Northern Colorado Water Association is exclusively used for domestic purposes, and the washing of Company trucks and other vehicles.

Sources and Characteristics of Wastes: Within the manufacturing cycle, no water has direct contact with the processing materials or products. The waters in use are entirely associated with cooling, and it is reported that heat increase represents the only potential pollutant. Wastewaters from the washing and cleaning of vehicles presumably contain dirt, soaps, cleaning solutions and some oils.

Treatment and Disposal of Wastes: At the time of plant visit, there was no overflow from the cooling water pond. Overflow, if occurring, would be released into the Larimer County Water Supply and Storage Company canal. The quality of these waters are presumed to be in conformance with general pollution limits to be prescribed by the State of Colorado in the future, for Basin-wide industries. However, some sampling and analyses of the overflow waters should be undertaken by the Company, if in fact these discharges are present.

Wastewaters from the washing of Company vehicles are directed into an abandoned quarry with no apparent overflow. The domestic sewage from the plant is released into two septic tanks followed by a leaching field.



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APPENDIX A FIGURE 1
by courtesy of

IDEAL CEMENT COMPANY	
MATERIAL FLOW GUIDE	
BOETTCHER PLANT	NOV. 21, 1958

LONGMONT PACKING COMPANY
Longmont, Colorado

Date of Visit: May 26, 1965

Discussion: The Longmont Packing Company operates a custom slaughterhouse receiving and processing about 15 beef cattle and 10 hogs per week. The Company employs 6 persons. Blood is recovered from the killing room and becomes an additive to hog feed. Meat scraps, bones and other material are salvaged within the slaughterhouse and transported to the Longmont Rendering Company. All process wastewater and domestic sewage from the establishment are disposed of into a septic tank followed by a leaching field. There is no possibility of surface return to St. Vrain Creek. However, there may be upward percolation to the land surface resulting from the leaching field.

LONGMONT RENDERING COMPANY
Longmont, Colorado

Date of Visit: May 26, 1965

Discussion: The Longmont Rendering Company has discontinued operations at their rendering plant in Longmont, Colorado. All raw materials previously received by the plant are now transported to Denver, Colorado.

LOVELAND PACKING COMPANY
1000 South Lincoln
Loveland, Colorado

Date of Visit: April 27, 1965

Persons Contacted: Arthur J. Moskal, President
William J. Faltermeier, Plant Manager

Process and Operation: The Loveland Packing Company operates a packing-house which receives and processes about 100 cattle and 250 hogs per week. The majority of carcasses are processed and prepared into primal cuts. A few animals are handled according to specific customers' specifications. The process consists of slaughtering, dressing and cutting of carcasses, and the rendering of edible and inedible parts including viscera, blood, meat scraps, and bones. The Company is in operation 9 hours per day, 5 days a week, and employs 35 persons in the plant and office.

Sources and Uses of Water: Plant water supply is obtained from both the City of Loveland and a single Company well. The City water amounting to about 13,000 gallons per day is employed for edible material processing, domestic uses, boiler makeup, and plant cleaning. The well water approximating 7,000 gallons per day, is used in the rendering operations.

Sources and Characteristics of Wastes: Major process wastes consist of washings from the dressing out and cutting of carcasses, paunch manure drainage, rendering cooker condensates, and spent waters from the clean-up of equipment and floors.

Treatment and Disposal of Wastes: The Loveland Packing Company initiated the operation of new waste treatment facilities in April 1965. The design capacity of the treatment plant is 65,000 gallons per day. Paunch manure is recovered by screens within the processing establishment and eventually used as fertilizer.

Process wastewaters containing grease are passed through a settling tank, and the grease on the surface of the tank is collected and returned to the rendering operations. The effluents from the settling unit are combined with the remaining plant wastes, pass through a 20-mesh rotary screen, receive aeration, and the total wastes are then discharged into a 365,000-gallon, unlined, treatment pond. At the time of visit, the water level in the pond was 18 inches below the opening in the overflow pipe.

The effluents from the waste treatment facilities of the Loveland Packing Company by design, are to be released into the Big Thompson Ditch No. 2. In the future, the Company also anticipates a twofold expansion

in their processing plant. It is recommended that any and all wastewater effluents released into the previously-mentioned canal, should not exceed the maximum allowable waste limits prescribed in the main report, for all such industrial wastes reaching Basin streams.

MINERAL CONCENTRATES AND CHEMICALS
Loveland, Berthoud, and Lake George, Colorado

Date of Visit: June 30, 1965

Person Contacted: William Badger, Production Manager

Process and Operation: Mineral Concentrates and Chemicals operates three separate operations located at Lake George, Loveland and Berthoud, Colorado. The Company is engaged in the mining, concentrating, and refining of beryllium ores. The beryllium is further incorporated into ceramic parts manufactured by the Company. The mining and concentrating works are located at Lake George. This mill also extracts and processes lead and zinc. The extraction of beryllium from the ores followed by conversion into beryllium oxide, is undertaken at the Loveland facilities. The oxide is then incorporated and fabricated into ceramic parts at the Berthoud plant.

Sources and Uses of Water: Some water is required at Lake George for concentrating the ores. Loveland uses minimum amounts of water in leaching the beryllium from the ores. No process water is required at the Berthoud plant.

Sources and Characteristics of Wastes: The only process wastes at Lake George are reported to be tailings. Liquid wastes from the Loveland operations are a mixture of beryllium, hydroxides, and possibly sodium sulfate.

Treatment and Disposal of Wastes: Wastewater containing solids are discharged from the Lake George mill to a tailings pond, and there is reported to be no drainage from the area. Process wastes from the Loveland plant are neutralized and disposed of to a seepage area. The Atomic Energy Commission carefully monitors these waste effluents. Trace amounts of beryllium have been found in the liquid wastes leaving the plant, but no beryllium has been detected within the seep area.

Sanitary sewage from the Lake George and Berthoud facilities is discharged into septic tanks. Domestic wastes from the Loveland plant are released into the sanitary sewers of the City of Loveland.

NEVILLE CIDER COMPANY
Loveland, Colorado

Date of Visit: April 27, 1965

Person Contacted: Mr. Neville

Process and Operation: The Neville Cider Company receives and processes both cherries and apples, with cherry juice and apple cider as the finished products. Incoming apples receive washing and pressing and the resulting juices are pasteurized and marketed as apple cider. Incoming cherries are washed and pressed, and the juices are diluted, pasteurized and marketed as cherry juice. The operations are conducted by two persons and are classed as seasonal. Cherry processing extends from June through August, and apple processing from mid-October to mid-November.

Sources and Uses of Water: Plant water supply is received from the City of Loveland. Major water uses are in diluting the cherry juices and the washing of plant equipment and floors.

Sources and Characteristics of Wastes: Process wastes originate from the washing of incoming fruit, and the washing and cleanup of plant equipment and floors.

Treatment and Disposal of Wastes: Liquid process wastes are discharged into a septic tank followed by a leaching field. Cooling waters used in the pasteurizing equipment are continuously recycled. Apple pulp is recovered for cattle feed, whereas cherry pulp together with miscellaneous debris are separately collected within the plant and taken to the City dump.

OID LOCKER COMPANY
Ovid, Colorado

Date of Visit: May 11, 1965

Discussion: The Ovid Locker Company is a custom slaughterhouse receiving and processing about 2 beef cattle per day, for 6 days each week. The carcasses after cleaning are removed to the locker plant and processed into primal cuts. Processing wastes from the slaughterhouse site, which include all blood, grease and solids, are disposed of by seepage into the ground adjacent to the slaughterhouse. The paunch manure and offal are separately collected from the operations and subsequently cooked and used as hog feed. There are no liquid wastes from the cookers. All processing wastes from the locker plant are discharged to the sanitary sewers of the town of Ovid.

Although the volume of wastes from the slaughterhouse is believed to be minimal so as to cause no problems in aesthetic nuisances or ground-water pollution, the local health department should recognize the existing situation. The preferred solution would be to discharge these processing wastes to the local sanitary sewer, if available. The town of Ovid at present time is completing arrangements for construction of a municipal sewage treatment plant. This treatment plant is intended to solve the existing problem of untreated domestic and municipal wastes being discharged to Lodgepole Creek and the South Platte River.

STERLING PACKING COMPANY
Sterling, Colorado

Discussion: The Sterling Packing Company discharges its processing wastes into a confined waste treatment lagoon. However, in more recent times, the Company has constructed a ditch designed to drain the lagoon into an irrigation canal. Reports indicate that the ditch receives waste effluents only on infrequent occasions. It is recommended that the Sterling Packing Company discontinue any and all releases of waste effluents into the irrigation canal. This may necessitate additional lagooning facilities, or other means of providing acceptable waste disposal.

WINDSOR PACKING COMPANY
Windsor, Colorado

Date of Visit: June 30, 1965

Person Contacted: Walter Yauk, President

Process and Operation: The Windsor Packing Company operates a slaughterhouse receiving and processing cattle, hogs, and lambs. On the average month, the plant processes 100 cattle, 100 hogs, and 10 lambs. The Company employs 9 persons working a 5-day week.

Sources and Uses of Water: Plant water supply approximating 6,500 gallons per day is obtained from a single Company well. This supply receives chlorination and is used in cooling and refrigeration, carcass washing and general plant cleanup.

Sources and Characteristics of Wastes: Major wastes from the establishment originate from the killing area, the washing and preparation of carcasses, and the cleaning of equipment and floors.

Treatment and Disposal of Wastes: At the time of visit, the plant reused the majority of spent cooling waters as water supply for livestock drinking; the remainder of cooling water was directed to irrigation of pasture lands. Process wastewaters are released into a pond, 70 by 40 feet by 6 feet deep, from which there was no observed overflow. Overflow, if any, would discharge to the Cache la Poudre River.

Paunch manure is collected and eventually used as fertilizer. Offal is separated and transported to the Capitol Rendering Company in Denver, Colorado. Blood is not recovered and is included in the process wastewaters.

In the event that overflow does occur from the treatment pond to the Cache la Poudre River, the quality of these effluents would be expected to conform to the general limits prescribed in the main report for all such industrial wastes entering Basin streams. The Company also anticipates a doubling of production in the foreseeable future and at that time, plans for an expansion of the waste treatment lagoon.